Partners in UK offshore wind

MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Environmental Statement

Volume 2, Chapter 7: Shipping and navigation

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Image of an offshore wind farm

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Errata

Errata reference number	Deadline included	Document number	Volume and chapter	Paragraph/ Table/Figure	Description of errata	Correction
16	D1	APP-025	Volume 2, Chapter 7: Shipping and navigation	Paragraph 7.9.4.23	The text should read: 'three hour 45 minute' instead of 'two hour 45 minute'.	The paragraph should read as follows: 'The IoMSPC Heysham to Douglas adverse weather routeing accounts for an additional 10 to 23 minutes of additional journey time per crossing on a three hour 45 minute journey, as identified within the 2022 AIS data. These transits tend to trend to the southwest and therefore it has been assumed that vessels would pass to the south and west of the Morgan Array Area. A revised passage plan was developed for the Heysham to Douglas route which passes south of the Morgan Array Area, continuing to the west before turning north up to Douglas on a more stable course. This would necessitate an additional 5.7 nm of steaming and a further 21.5 minutes of transit time. This would be in addition to existing delays of approximately between 10 and 23 minutes to total delay of at least 31.5 minutes per crossing on an advertised journey of three hours and 45 minutes.'

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7.1	Navigational risk assessment

Glossary

Term	Meaning
Adverse Weather	Severe weather that creates potentially unsafe conditions for vessel transits.
Aid to Navigation	Any sort of signal or marker to support vessel navigation including buoys, beacons or lights.
Allision/Contact	Vessel makes contact with a fixed or floating object such as wind turbine.
Anchorage	A designated area where ships lower their anchors to remain in position.
As Low as Reasonably Practicable	The principle that risk should be reduced as far as possible before further reduction is disproportionate to the costs of doing so.
Automatic Identification System	An automatic tracking system carried by ships that broadcasts their position and identity to other nearby vessels.
Beam	Side or width of a vessel.
Berth	The specific location within a port or harbour where a vessel is moored, usually for the purposes of loading or unloading.
Bridge	The principal control centre from a vessel where it is navigated.
Cardinal Mark	A sea mark used in maritime pilotage to indicate the position of a hazard and the direction of safe water.
Cargo Shift	The dangerous movement of goods aboard a vessel, typically resulting in damage.
Closest Point of Approach	The estimated point and distance at which two vessels or objects will reach their minimum value.
Collision	Coming together of two vessels underway.
Draught	The maximum depth of any part of a vessel.
Fog	Where visibility is less than 1,000 metres.
Gale	Winds in excess of 34 knots.
Grounding	Vessel makes contact with the seabed/shoreline or underwater assets.
Hydrography	The science and measurement of the physical features of the seabed.
Lee	The area of water downwind of an obstacle, such as a landmass.
Master	The designated person in charge of a ship, its crew, passengers and cargo.
Morgan Potential Array Area	The area that was presented in the Morgan Generation Assets PEIR as the area within which the wind turbines, foundations, inter-array cables, interconnector cables and offshore substation platforms (OSPs) forming the Morgan Generation Assets. This area was the boundary consulted on during statutory consultation and subsequently refined for the application for Development Consent.
Nautical Charts	A graphic representation of a sea area and adjacent coastal regions.
Passage Plan	A detailed description of a vessel's voyage from start to finish, including the route and hazards likely to be encountered along the way.

Term	Meaning
Pilot	Professional seafarers with detailed knowledge of a port and expertise in ship manoeuvring.
Port or Harbour	A maritime facility compromising of one or more wharves or loading areas where ships load and discharge cargo or passengers.
Routeing	The path taken by a vessel.
Significant Wave Height	The average wave height from trough to crest of the highest one-third of waves.
Snagging	Fishing Gear or anchors coming fast on subsurface infrastructure such as cables.
Tonnage	The weight in tons of cargo or freight.
Traffic Separation Scheme	A routeing measures aimed at the separation of opposing streams or traffic by appropriate means and by the establishment of traffic lanes.
Turnaround	The process and activities necessary between the arrival of a vessel in port and its departure, including unloading and loading of passengers or cargo.
Under Keel Clearance	The vertical distance between the bottom of a ship and the seabed.
Vessel Monitoring System	Satellite tracking system using a device on vessel which transmits the location, speed and course of the vessel.
Vessel Traffic Services	A marine traffic monitoring system established by port authorities to manage vessel movements and safety.

Acronyms

Acronym	Description
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ANMP	Aids to Navigation Management Plan
AtoN	Aid to Navigation
BEIS	Department for Business, Energy and Industrial Strategy
CBRA	Cable Burial Risk Assessment
CEA	Cumulative Effects Assessment
CMS	Construction Method Statement
CP	Construction Plan
CPA	Closest Point of Approach
CRNRA	Cumulative Regional Navigation Risk Assessment
CSIP	Cable Specification and Installation Plan
CTV	Crew Transfer Vessel
DCO	Development Consent Order
DfT	Department for Transport

Acronym	Description
DP	Design Plan
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERCOP	Emergency Response and Cooperation Plan
FLCP	Fisheries Liaison and Co-existence Plan
FSA	Formal Safety Assessment
HMCG	His Majesty's Coastguard
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
IoMSPC	Isle of Man Steam Packet Company
IWRAP	IALA Waterway Risk Assessment Program
LAT	Lowest Astronomical Tide
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MPCP	Marine Pollution Contingency Plan
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MNEF	Marine Navigation Engagement Forum
NFFO	National Federation of Fishermen's Organisation
NPS	National Policy Statement
NRA	Navigational Risk Assessment
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platforms
PEIR	Preliminary Environmental Information Report
PIANC	The World Association for Waterborne Transport Infrastructure
PPE	Personal Protective Equipment
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SIRA	Simplified IALA Risk Assessment Method
SOLAS	Safety of Life at Sea

Acronym	Description
TSS	Traffic Separation Scheme
UKHO	UK Hydrographic Office
UNCLOS	UN Convention on the Law of the Sea
VHF	Very High Frequency
VMS	Vessel Monitoring System
VTMP	Vessel Traffic Management Plan

Units

Unit	Description
%	Percentage
£	Pound sterling
Hs	Significant wave height
km	Kilometres
km^2	Square kilometres
Knot	Nautical miles per hour
m	Metres
m/s	Metres per Second
MW	MegaWatts
nm	Nautical miles (1,852 meters)

7 Shipping and Navigation

7.1 Introduction

7.1.1 Overview

7.1.1.1 This chapter of the Environmental Statement presents the assessment of the potential impact of the Morgan Offshore Wind Project: Generation Assets, hereafter referred to as the Morgan Generation Assets, on shipping and navigation. Specifically, this chapter considers the potential impact of the Morgan Generation Assets during the construction, operations and maintenance, and decommissioning phases.

7.1.1.2 Both the Morgan and Morecambe Offshore Wind Projects were scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review. The output of this process concluded that both Projects should work collaboratively in connecting the offshore wind farms to the National Grid at Penwortham in Lancashire. Therefore, a separate joint application for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets is being made for the shared offshore export cable corridors to landfall and shared onshore export cable corridors to onshore substations.

7.1.1.3 This chapter draws upon information contained within Volume 4, Annex 7.1: Navigational Risk Assessment (NRA) of the Environmental Statement. The NRA has been produced for the Morgan Generation Assets in accordance with Maritime and Coastguard Agency (MCA) requirements under the relevant guidance.

7.1.1.4 A Cumulative Regional Navigational Risk Assessment (CRNRA) was undertaken collaboratively between the developers of the Morgan Generation Assets, Mona Offshore Wind Project and Morecambe Offshore Windfarm: Generation Assets (hereafter referred to as the Morecambe Generation Assets) (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) and is used to inform the cumulative effects assessment (CEA) in section 7.11 of this chapter.

7.1.1.5 The assessment presented is also informed by the following chapters:

- Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement
- Volume 2, Chapter 9: Other sea users of the Environmental Statement
- Volume 2, Chapter 11: Aviation and radar of the Environmental Statement.

7.1.1.6 In April 2023, the Preliminary Environmental Information Report (PEIR) for the Morgan Generation Assets was published to support the pre-application consultation activities required under the 2008 Act. The shipping and navigation assessment of the PEIR noted that significant effects existed for impacts on both ferry routeing and collision risk. In addition, the CEA noted that significant effects existed for impacts to ferry routeing, collision and allision risk when combined with other adjacent cumulative projects.

7.1.1.7 Following the completion of the PEIR and Section 42 consultation, the Morgan Generation Assets made several project changes and commitments to reduce these impacts, namely:

- Removal of ‘hump’ in northern corner and tapering of the northern boundary of the Morgan Potential Array Area
- Increasing the distance between the Morgan Potential Array Area and the Walney offshore wind farms from between 2.7/4.1 nm to between 4.3/5.3 nm

- Commitment to two lines of orientation in the arrangement of wind turbines and offshore substation platforms (OSPs) within the Morgan Array Area.

7.1.1.8 Both Mona Offshore Wind Limited and Morecambe Offshore Windfarm Limited made similar commitments to further reduce the impacts to shipping and navigation in a cumulative context.

7.1.1.9 These commitments form the basis of the project design assessed for the Application and are further described in Volume 1, Chapter 4, Site selection and consideration of alternatives of the Environmental Statement.

7.2 Legislative and policy context

7.2.1 Planning policy context

7.2.1.1 The Morgan Generation Assets will be located in English offshore waters (beyond 12 nm from the English coast). As set out in Volume 1, Chapter 1: Introduction of the Environmental Statement, as the Morgan Generation Assets is an offshore generating station with a capacity of greater than 100 MW located in English waters, it is a Nationally Significant Infrastructure Project as defined by Section 15(3) of the Planning Act 2008 (as amended) (the 2008 Act). As such, there is a requirement to submit an application for a Development Consent Order (DCO) to the Planning Inspectorate to be decided by the Secretary of State for the Department for Energy Security and Net Zero.

7.2.2 National Policy Statements

7.2.2.1 There are currently six energy National Policy Statements (NPSs), two of which contain policy relevant to offshore wind development and the Morgan Generation Assets, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero, 2023a)
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero, 2023b).

7.2.2.2 NPS EN-3 includes guidance on what matters are to be considered in the assessment. These are summarised in Table 7.1. NPS EN-3 also highlight a number of factors relating to the determination of an application and in relation to mitigation. These are summarised in Table 7.2.

Table 7.1: Summary of the NPS EN-3 provisions relevant to shipping and navigation.

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
Offshore wind farms and offshore transmission will occupy an area of the sea or sea bed. For offshore wind farms in particular it is inevitable that there will be an impact on navigation in and around the area of the site. This is relevant to both commercial and recreational users of the sea who may be affected by disruption or economic loss because of the proposed offshore wind farm and/or offshore transmission. [Paragraph 2.8.178]	Impact on vessel routeing is considered in section 7.9.3 and section 7.9.4 for ferries and other commercial shipping. Routeing in both typical and adverse weather conditions is considered.

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
To ensure safety of shipping applicants should reduce risks to navigational safety to As Low As Reasonably Practicable (ALARP), as described in Section 2.8.321. [Paragraph 2.8.179]	The guidance and process followed in producing this NRA are described within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
There is a public right of navigation over navigable tidal waters and in International Law, foreign vessels have the right of innocent passage through the UK's territorial waters. [Paragraph 2.8.180]	A summary of key legislation and policy is contained in section 7.2.
Beyond the seaward limit of the territorial sea, shipping has the freedom of navigation although offshore infrastructure and the imposition of safety zones can hinder this. [Paragraph 2.8.181]	Applied risk controls, including safety zones (as described in the Safety Zone Statement (Document Reference J5)), are described in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Additional risk control options are identified in section 7.14 and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Impacts on navigation can arise from the wind farm or other infrastructure and equipment creating a physical barrier during construction and operation. [Paragraph 2.8.182]	Impact on vessel routeing is considered in section 7.9.3 and section 7.9.4 for ferries and other commercial shipping. Impacts to small craft routeing are considered in section 7.9.10.
There may be some situations where reorganisation of shipping traffic activity might be both possible and desirable when considered against the benefits of the wind farm and/or offshore transmission application and such circumstances should be discussed with the Government officials, including Secretary of State and MCA, and other stakeholders, including Trinity House, as The General Lighthouse Authority consultee, and the commercial shipping sector. It should be recognised that alterations might require national endorsement and international agreement and that the negotiations involved may take considerable time and do not have a guaranteed outcome. [Paragraph 2.8.183]	Significant consultation has been undertaken through the Marine Navigation Engagement Forum (MNEF), individual meetings, hazard workshops and written correspondence. These are summarised in the NRA (Volume 4, Annex 7.1 of the Environmental Statement). Through this engagement feedback has been received on the impacts of the Morgan Generation Assets on different receptors, and as a result, substantial alterations were made to the Morgan Generation Assets design to minimise these impacts.
Applicants should engage with interested parties in the navigation sector early in the pre-application phase of the proposed offshore wind farm or offshore transmission to help identify mitigation measures to reduce navigational risk to ALARP, to facilitate proposed offshore wind development. This includes the Marine Management Organisation (MMO) or Natural Resources Wales in Wales, MCA, the relevant General Lighthouse Authority, such as Trinity House, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected. This should continue throughout the life of the development including during the construction, operation and decommissioning phases. [Paragraph 2.8.184]	
Engagement should seek solutions that allow offshore wind farms, offshore transmission and navigation and shipping users of the sea to successfully co-exist.	

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
[Paragraph 2.8.185]	
The presence of the wind turbines can also have impacts on communication and shipborne and shore-based radar systems. See section 5.5 in EN-1 for further guidance. [Paragraph 2.8.186]	Impacts on shipborne and shorebased navigation, communication and positioning systems are described in section 7.9.9.
Prior to undertaking assessments applicants should consider information on internationally recognised sea lanes, which is publicly available. [Paragraph 2.8.187]	The NRA utilises a number of different datasets of shipping and navigation activities and features across the Shipping and Navigation Study Area (see Volume 4, Annex 7.1 of the Environmental Statement). The proximity of the Traffic Separation Schemes in the Irish Sea was assessed and it is concluded that there are no significant effects.
Applicants should refer in assessments to any relevant, publicly available data available on the Maritime Database. [Paragraph 2.8.188]	
Applicants must undertake an NRA in accordance with relevant government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above. [Paragraph 2.8.189]	An NRA has been undertaken and is provided in Volume 4, Annex 7.1 of the Environmental Statement. The NRA follows MCA guidance MGN654 and the International Maritime Organizations (IMO) Formal Safety Assessment. The NRA includes detailed vessel traffic data collection and analysis for the Shipping and Navigation Study Area (and with data durations in excess of MGN654 requirements). The NRA for the Morgan Generation Assets concluded that there were no unacceptable risks and that all risks had been reduced to Broadly Acceptable or ALARP. A Cumulative Regional NRA (CRNRA) has also been undertaken to assess the impacts of the Morgan Generation Assets in combination with the Mona Offshore Wind Project and Morecambe Generation Assets and other Tier 1 and Tier 2 projects. The CRNRA is available in Volume 4, Annex 7.1: Navigational Risk Assessment of the Environmental Statement. The CRNRA, undertaken with the Mona Offshore Wind Project, Morgan Offshore Wind Project and Morecambe Offshore Windfarm, concluded that there were no unacceptable risks and that all risks had been reduced to Broadly Acceptable or ALARP. An addendum which included the Mooir Vannin Offshore Windfarm Scoping Boundary identified unacceptable risks for passages between the Morgan Array Area and Mooir Vannin Offshore Wind Farm Scoping Boundary.
The navigation risk assessment will for example necessitate: • a survey of vessel traffic in the vicinity of the proposed wind farm; • a full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant marine guidance; and • cumulative and in-combination risks associated with the development and other developments (including other wind farms) in the same area of sea. [Paragraph 2.8.190]	
In some circumstances, applicants may seek declaration of a safety zone around wind turbines and other infrastructure. Although these might not be applied until after consent to the wind farm has been granted. [Paragraph 2.8.191]	Applied risk controls, including safety zones (as described in the Safety Zone Statement (Document Reference J5)), are described in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Additional risk control options are identified in section 7.14 and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
The declaration of a safety zone excludes or restricts activities within the defined sea areas including navigation and shipping. [Paragraph 2.8.192]	
Where there is a possibility that safety zones will be sought applicant assessments should include potential effects on navigation and shipping.	

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
[Paragraph 2.8.193]	
Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA for advice on maritime and safety and refer to the government guidance on safety zones as a part of this process. [Paragraph 2.8.194]	
Applicants should undertake a detailed Navigational Risk Assessment, which includes Search and Rescue (SAR) Response Assessment and emergency response assessment prior to applying for consent. The specific SAR requirements will then be discussed and agreed post-consent. [Paragraph 2.8.195]	Impacts on SAR are described in section 7.9.6.

Table 7.2: Summary of NPS EN-3 policy on decision making relevant to shipping and navigation.

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
The Secretary of State should not grant development consent in relation to the construction or extension of an offshore wind farm if it considers that interference with the use of recognised sea lanes essential to international navigation is likely to be caused by the development. [Paragraph 2.8.326]	Relevant International Maritime Organisation (IMO) routeing measures, including the Liverpool Bay Traffic Separation Scheme (TSS), are considered in relation to the Morgan Array Area in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Sea lane locations are presented in section 7.5 and impact on vessel routeing measures presented in section 7.9.2 and section 7.9.3 which concluded there are no significant effects.
The use of recognised sea lanes essential to international navigation means: a) anything that constitutes the use of such a sea lane for the purposes of article 60(7) of the United Nations Convention on the Law of the Sea (UNCLOS) 1982; and b) any use of waters in the territorial sea adjacent to Great Britain that would fall within paragraph (a) if the waters were in a Renewable Energy Zone. [Paragraph 2.8.327]	
The Secretary of State should be satisfied that the site selection has been made with a view to avoiding or minimising disruption or economic loss to the shipping and navigation industries with particular regard to approaches to ports and to strategic routes essential to regional, national and international trade, lifeline ferries and recreational users of the sea. [Paragraph 2.8.328]	Impact on vessel routeing is considered in section 7.9.3 and section 7.9.4 for ferries and other commercial shipping. Routeing in both typical and adverse weather conditions is considered.
Where after carrying out a site selection, a proposed development is likely to adversely affect major commercial navigation routes, for instance by causing appreciably longer transit times, the Secretary of State should give these adverse effects substantial weight in its decision making. [Paragraph 2.8.329]	

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
Where a proposed offshore wind farm is likely to affect less strategically important shipping routes, the Secretary of State should take a pragmatic approach to considering proposals to minimise negative impacts. [Paragraph 2.8.330]	
The Secretary of State should be satisfied that risk to navigational safety is ALARP. It is Government policy that wind farms and all types of offshore transmission should not be consented where they would pose unacceptable risks to navigational safety after mitigation measures have been adopted. [Paragraph 2.8.331]	The guidance and process followed in producing this NRA are described within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
The Secretary of State should be satisfied that the scheme has been designed to minimise the effects on recreational craft and that appropriate mitigation measures, such as buffer areas, are built into applications to allow for recreational use outside of commercial shipping routes. [Paragraph 2.8.332]	Impacts on recreational craft are described in section 7.9.10.
In view of the level of need for energy infrastructure, where an adverse effect on the users of recreational craft has been identified, and where no reasonable mitigation is feasible, the Secretary of State should weigh the harm caused with the benefits of the scheme. [Paragraph 2.8.333]	
The Secretary of State should make use of advice from the MCA, who will use the NRA described in paragraphs 2.8.179 and 2.8.180 above. [Paragraph 2.8.334]	Relevant stakeholders have been consulted throughout, including the MCA. A summary of the key issues raised during consultation activities, the consultee and the consultation activity undertaken is provided in section 7.3 and Table 7.4. The MNEF was established for the Morgan Generation Assets. Two hazard workshops were undertaken and is described in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Impacts to navigation are described in section 7.10 and the guidance and process for producing the NRA is set out in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
The Secretary of State should have regard to the extent and nature of any obstruction of or danger to navigation which (without amounting to interference with the use of such sea lanes) is likely to be caused by the development in determining whether to grant consent for the construction, or extension, of an offshore wind farm, and what requirements to include in such a consent. [Paragraph 2.8.335]	Impacts to navigation are described in section 7.10 and the guidance and process for producing the NRA are set out in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
The Secretary of State may include provisions, compliant with national maritime legislation and UNCLOS, within the terms of a development consent as respects rights of navigation so far as they pass through waters in or adjacent to Great Britain which are between the mean low water mark and the seaward limits of the territorial sea. [Paragraph 2.8.336]	Applied risk controls, including safety zones (as described in the Safety Zone Statement (Document Reference J5)), are described in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Additional risk control options are identified in section 7.14 and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Summary of NPS EN-3 provision	How and where considered in the Environmental Statement
The provisions may specify or describe rights of navigation which: • are extinguished; • are suspended for the period that is specified in the DCO; • are suspended until such time as may be determined in accordance with provisions contained in the DCO; and • are exercisable subject to such restrictions or conditions, or both, as are set out in the DCO. [Paragraph 2.8.337]	
The Secretary of State should specify the date on which any such provisions are to come into force, or how that date is to be determined. [Paragraph 2.8.338]	
The Secretary of State should require the applicant to publish any provisions that are included within the terms of the DCO, in such a manner as appears to the Secretary of State to be appropriate for bringing them, as soon as is reasonably practicable, to the attention of persons likely to be affected by them. [Paragraph 2.8.339]	
The Secretary of State should include provisions as respects rights of navigation within the terms of a DCO only if the applicant has requested such provision be made as part of their application for development consent. [Paragraph 2.8.340]	

7.2.3 North West Inshore and North West Offshore Coast Marine Plans

7.2.3.1 The shipping and navigation impact assessment has also been made with consideration to the specific policies set out in the North West Inshore and North West Offshore Coast Marine Plans (MMO, 2021). Key provisions are set out in Table 7.3 along with details as to how these have been addressed within the assessment.

Table 7.3: North West Inshore and North West Offshore Marine Plan policies of relevance to shipping and navigation.

Policy	Key provisions	How and where considered in the Environmental Statement
NW-PS-1	Only proposals demonstrating compatibility with current port and harbour activities will be supported. Proposals within statutory harbour authority areas or their approaches that detrimentally and materially affect safety of navigation, or the compliance by statutory harbour authorities with the Open Port Duty or the Port Marine Safety Code, will not be authorised unless there are exceptional circumstances. Proposals that may have a significant adverse impact upon future opportunity for sustainable expansion of port and harbour activities, must demonstrate that they will, in order of preference: a) avoid, b) minimise, c) mitigate adverse impacts so they are no longer significant. If it is not possible to mitigate significant adverse impacts, proposals should state the case for proceeding.	Impacts to navigation are described in section 7.10 and in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. In particular, the impacts on commercial shipping routes and the approaches to ports/harbours are given in sections 7.9.2, 7.9.3 and 7.9.4.
NW-PS-2	Proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance must not be authorised within or encroaching upon IMO routeing systems unless there are exceptional circumstances.	Sea lane locations are presented in section 7.5 and impact on vessel routeing measures presented in section 7.9.2. The assessment demonstrates that the Morgan Generation Assets does not encroach upon routeing schemes such as TSS.
NW-PS-3	Proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance which encroaches upon high density navigation routes, strategically important navigation routes, or that pose a risk to the viability of passenger services, must not be authorised unless there are exceptional circumstances.	Inter-array and interconnector cables within the Morgan Array Area would be in sufficiently deep water that any cable protection would not compromise the clearances required for deep draught vessels. The assessment demonstrates that the Morgan Generation Assets does not significantly reduce Under Keel Clearance.

7.3 Consultation

7.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to shipping and navigation is presented in Table 7.4, together with how these issues have been considered in the production of this chapter. Further detail is presented within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.3.1.2 A Marine Navigation Engagement Forum (MNEF) was established to disseminate information regarding the Morgan Generation Assets, Mona Offshore Wind Project, Morecambe Offshore Windfarm: Generation Assets and Morgan and Morecambe Offshore Wind Farms: Transmission Assets within a wide stakeholder forum and to identify and discuss any key navigational concerns. The MNEF met six times between 2021 and 2024. A description of the MNEF meetings is contained within Table 7.4 and the Technical Engagement Plan of the Environmental Statement (Document Reference E.4).

Table 7.4: Summary of key consultation issues raised during consultation activities undertaken for the Morgan Generation Assets relevant to shipping and navigation.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
14 October 2021	MCA Consultation meeting.	• Project introduction and proposed approach • Data collection strategy (incl. survey timings).	Survey details are contained within section 7.4.6.
10 November 2021	MNEF Members MNEF Meeting	• Project introduction and proposed approach • Site selection in relation to shipping and navigation constraints • Impacts of COVID-19 on data collection • Impacts to ferry operators (Safety and Commercial) • Relation of impacts on ferry routes with regulation and guidance • Sensitivity of ferry operator schedules.	The data collection strategy is provided in sections 7.4.1, 7.4.4 and 7.4.6. Site selection approach is described in Volume 1, Chapter 4, Site selection and consideration of alternatives of the Environmental Statement. Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
01 February 2022	MCA & Trinity House Consultation meeting.	• Methodological engagement • Update on proposed approach for assessment • Status of NPS updates • Requirement for cumulative assessment • Adverse ship routeing assessment • Consenting of Walney Extension and assessment of gap with the North East Potential Development Area • Modelling to reflect local navigational conditions.	Relevant methodology and guidance are given in sections 7.4.1, 7.6 and 7.2. Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
09 February 2022	Department for Business, Energy and Industrial Strategy (BEIS) Consultation meeting.	• Methodological engagement • Introduction to project and proposed approach for assessment • Status of NPS updates and role of BEIS • Engagement with wider stakeholders.	Relevant methodology and guidance are given in sections 7.4.1, 7.6 and 7.2.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
14 February 2022	UK Chamber of Shipping Seatruck Ferries Stena Line Isle of Man Steam Packet Company (IoMSPC) MCA Consultation meeting.	• Methodological engagement. • Relation of impacts on ferry routes with regulation and guidance • Site selection in relation to shipping and navigation constraints • Impacts to ferry operators (Safety and Commercial) • Need for a cumulative assessment • Adverse weather routeing decision making • Need for collaborative engagement in assessment.	Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Adverse weather routeing impacts are described in section 7.9.4.
15 March 2022	Request for Info Letter: Seatruck Ferries Stena Line IoMSPC P&O Questionnaire.	• Request for Info Letter • Questionnaire issued to operators requesting details of existing operational details and constraints in normal and adverse weather.	Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
04 April 2022	IoMSPC Consultation meeting.	• Baseline data gathering • Review of current operations and constraints • Review of impacts and decision making in adverse weather • Review of future changes to operations • Significance and potential impacts to IoMSPC and Isle of Man.	Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
05 April 2022	IoMSPC Consultation meeting.	• Crossing from Douglas to Heysham aboard Ben-my-Chree • Discussions with master on decision making and passage planning.	Commercial impacts to ferry operators are described in section 7.9.3.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
05 April 2022	Seatruck Ferries Consultation meeting.	• Baseline data gathering • Site selection and shipping and navigation constraints • Potential impacts of the three Round 4 Irish Sea offshore wind farm projects on safety and commercial operations for Seatruck • Review of current operations and constraints • Review of impacts and decision making in adverse weather • Review of future changes to operations.	Commercial impacts to ferry operators are described in section 7.9.3. Site selection approach is described in Volume 1, Chapter 4, Site selection and consideration of alternatives of the Environmental Statement. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Future case scenario development is described in section 7.5.5 and within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
14 April 2022	Stena Consultation meeting.	• Baseline data gathering • Potential impacts of projects on safety and commercial operations for Stena • Review of current operations and constraints • Review of impacts and decision making in adverse weather • Review of future changes to operations.	The data collection strategy is provided in sections 7.4.1, 7.4.4 and 7.4.6. Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section 7.9.3 and section 7.9.4 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Future case scenario development is described in section 7.5.5 and within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
20 April 2022	Spirit Energy Written correspondence.	• Impacts to Spirit Energy • Impacts to marine and aviation movements to offshore platforms and rigs • Requirement for safe passing distances and exclusion areas • Increased traffic flow and collision risk.	Oil and gas activities are described in section 7.5. Safety impacts to oil and gas operations are described throughout the impact assessment within section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
21 April 2022	RYA Consultation meeting.	• RYA Consultation and Survey Strategy • Introduction to project and assessment approach • Availability of RYA Recreational Atlas • Summer survey strategy • Further engagement opportunities.	Data collection strategy is provided in sections 7.4.1, 7.4.4 and 7.4.6. Impacts on recreational craft are described in section 7.9.10.
05 May 2022	Harbour Energy Written correspondence.	• Impacts to Harbour Energy • Decommissioning Plan for Millom West • Impacts to marine and aviation movements to offshore platforms and rigs • Requirement for safe passing distances and exclusion areas • Increased traffic flow and collision risk.	Oil and gas activities are described in section 7.5. Safety impacts to oil and gas operations are described throughout the impact assessment within section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
06 May 2022	MNEF Members MNEF Meeting	• Project update • Cumulative impacts of multiple projects on ferry operations • How the cumulative impacts will be assessed or examined • Impacts of projects on Isle of Man economy/society • Extent of incident data • Safety of navigating in gaps • Consequences of allisions with wind turbines.	Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Data collection strategy is provided in sections 7.4.1, 7.4.4 and 7.4.6. Impacts of project, including consequences, are described in section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
23 May 2022	Trinity House Scoping Opinion.	• Assessment approach MGN654 compliance • Cumulative impacts to be assessed • Additional and impacts to existing Aids to Navigation (AtoN) • Decommissioning Plan.	Relevant methodology and guidance are given in sections 7.4.1, 7.6 and section 7.2. Cumulative impacts are summarised in section 7.11. Applied risk controls, including safety zones, are described within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Additional risk control options are identified in section 7.14 and within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
30 May 2022	MCA Scoping Opinion.	• Assessment approach MGN654 compliance • Impacts on vessel routeing and adverse weather routeing • Cumulative impacts to be assessed • Wind turbine layouts to comply with MGN654.	Relevant methodology and guidance are given in sections 7.4.1, 7.6 and 7.2. Cumulative impacts are summarised in section 7.11. Impacts on vessel routeing are described in section 7.9.3. Applied risk controls, including safety zones, are described within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Additional risk control optioned are identified in section 7.14 and within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
31 May 2022	Isle of Man Government Scoping Opinion.	• Cumulative impacts of multiple developments • Inclusion of Isle of Man Orsted offshore wind farm proposal • Impacts on IoMSPC routes into Douglas • Impacts to adverse weather routeing and safe shelter • Impacts to SAR capabilities.	Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11. Commercial impacts to ferry operators are described in section 7.9.3. Safety impacts to ferry routes are described throughout the impact assessment within section and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Impacts to SAR are described in section 7.9.6.
15 June 2022	Planning Inspectorate Scoping Opinion.	• Assessment approach and shipping and navigation study area.	Relevant methodology and guidance are given in sections 7.4.1, 7.6 and section 7.2. The shipping and navigation study area is described in section 7.4.4.
30 June 2022	Seatruck Consultation meeting.	• Bridge Simulations Preparations for the Morgan Potential Array Area to inform PEIR • Determination of routes for assessment • Review of weather conditions and constraints • Definition of traffic and emergency scenarios • Assessment criteria and run order.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
20 July 2022 21 July 2022	IoMSPC Bridge Simulations.	• Bridge Simulations Preparations for the Morgan Potential Array Area to inform PEIR • Determination of routes for assessment • Review of weather conditions and constraints • Definition of traffic and emergency scenarios • Assessment criteria and run order.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations.
11 August 22 12 August 22	Stena Line Bridge Simulations.	• Bridge Simulations Preparations for the Morgan Potential Array Area to inform PEIR • Determination of routes for assessment • Review of weather conditions and constraints • Definition of traffic and emergency scenarios • Assessment criteria and run order.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations.
17 August 2022 18 August 2022 19 August 2022	IoMSPC Bridge Simulations.	• Bridge simulations for the Morgan Potential Array Area to inform PEIR • Safety of transits in adverse weather and traffic through Morgan-Walney offshore wind farms.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations. Safety impacts to ferry routes are described throughout the impact assessment within section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
23 August 2022 24 August 2022 25 August 2022	Stena Line Bridge Simulations.	• Bridge simulations for the Morgan Potential Array Area to inform PEIR • Safety of transits in adverse weather and traffic through the Mona-Morgan/Mona-Morecambe routes.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations. Safety impacts to ferry routes are described throughout the impact assessment within section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
08 September 2022 09 September 2022	Seatruck Bridge Simulations.	• Bridge simulations for the Morgan Potential Array Area to inform PEIR • Safety of transits in adverse weather and traffic through Mona-Morgan.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reports the findings of the navigational simulations. Safety impacts to ferry routes are described throughout the impact assessment within section 7.10 and the risk assessment within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
03 October 2022	Various Consultation Meeting.	• Webinar to prepare for hazard workshops for the Morgan Potential Array Area to inform PEIR.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the hazard workshop.
10 October 2022	MNEF Members	• Project update • Application process • Approach to cumulative assessment • Introduction to Morgan and Morecambe Offshore Wind Farms: Transmission Assets.	Section 7.2 describes the relevant legislation and policies.
10 October 2022	Various – Hazard Workshop Hazard Workshop.	• Cumulative Hazard Workshop for the Morgan Potential Array Area to inform PEIR.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the hazard workshop.
11 October 2022	Various – Hazard Workshop Hazard Workshop.	• Hazard Workshops for the Morgan Potential Array Area to inform PEIR.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the hazard workshop.
19 October 2022	Isle of Man Government Consultation meeting.	• Impacts on Isle of Man economy • Status of future Isle of Man offshore developments.	Cumulative impacts are presented in section 7.11 and summarised in Table 7.42.
20 October 2022	Orsted Consultation meeting.	• Update on Isle of Man (Mooir Vannin) Offshore Wind Farm.	Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
18 January 2023	MNEF Members	• Project update on boundary amendments and how commitments will be tested post PEIR.	A summary of the NRA results following boundary amendments are contained in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
31 May 2023	MCA S42 Responses.	• Concern over loss of safe navigable sea space that would increase collision risk.	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the risk assessment.
02 June 2023	IoM Government S42 Responses.	• Cumulative impact on lifeline routes to Isle of Man • Inclusion of the of Isle of Man (Mooir Vannin) Offshore Wind Farm within the CEA • Impact on emergency response capability • Additional fuel usage and emissions.	Impacts to ferry routes are presented in section 7.9.3 and 7.9.4. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11. Impacts to emergency response are presented in section 7.9.6. Cumulative impacts are presented in section 7.10 and summarised in Table 7.42.
02 June 2023	IoMSPC S42 Responses.	• Impact on IoM community lifeline routes • Impact on turnaround times/goods supply • Navigation safety impacts due to insufficient space between wind farms • Increased fuel costs and emissions • Reputational damage and loss of volumes/revenues.	Impacts to ferry routes are presented in section 7.9.3 and 7.9.4. Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the risk assessment. Cumulative impacts are presented in section 7.10 and summarised in Table 7.42.
02 June 2023	Trinity House S42 Responses.	• Requirements for marking, lighting and notification.	Relevant commitments to mitigation measures are presented in section 7.7.1.2.
02 June 2023	UK Chamber of Shipping S42 Responses.	• Impacts on vital shipping services • PEIR consultation given proposed changes to the Morgan Array Area boundary • Financial costs of fuel and increased emissions • Inclusion of Isle of Man (Mooir Vannin) Offshore Wind Farm within the CEA.	Impacts to ferry routes are presented in section 7.9.3 and 7.9.4. Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the risk assessment. Cumulative impacts are presented in section 7.10 and summarised in Table 7.42.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
02 June 2023 Stena Line S42 Responses.		• Impacts on safety, welfare and job security of workforce • Impact on bunker fuel consumption • Impact on freight and passenger safety • Cumulative impacts with Isle of Man wind farm • Risk assessment method • Increase in lights making vessel identification more difficult.	Impacts to ferry routes are presented in section 7.9.3 and 7.9.4. Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the risk assessment. Cumulative impacts are presented in section 7.10 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.
02 June 2023 Seatruck S42 Responses.		• Cumulative impact on vessel traffic between wind farms • Impact on emergency response • Impact on fuel/cancellations of ferries • Impact of increased fuel on environment.	Impacts to ferry routes are presented in section 7.9.3 and 7.9.4. Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement describes the findings of the risk assessment. Impacts to emergency response are presented in section 7.9.6. Cumulative impacts are presented in section 7.10 and summarised in Table 7.42.
23 May 2023 24 May 2023 25 May 2023	Stena Line Bridge Navigation Simulations.	• Update to navigation bridge simulations of the Morgan Array Area to inform Environmental Statement.	A summary of the navigation simulations is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
22 June 2023 23 June 2023	Seatruck Bridge Navigation Simulations.	• Update to navigation bridge simulations of the Morgan Array Area to inform Environmental Statement.	A summary of the navigation simulations is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
13 September 2023 14 September 2023 15 September 2023	IoMSPC Bridge Navigation Simulations.	• Update to navigation bridge simulations of the Morgan Array Area to inform Environmental Statement.	A summary of the navigation simulations is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
21 September 2023	MNEF Members Consultation meeting.	• Project update and review of boundary changes.	Project details for assessment in the Environmental Statement are defined in section 7.7.
28 September 2023	Shipping and navigation stakeholders including, statutory consultees, commercial operators, fishing industry and other sea users. In person hazard workshop.	• Cumulative NRA hazard workshop undertaken to inform the Environmental Statement.	A summary of the hazard workshop, including details of attendees, is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
29 September 2023	Shipping and navigation stakeholders including, statutory consultees, commercial operators, fishing industry and other sea users. In person hazard workshop.	• Morgan Generation Assets NRA hazard workshop undertaken to inform the Environmental Statement.	A summary of the hazard workshop, including details of attendees, is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
07 December 2023	Seatruck Consultation Meeting	• Review of engagements and assessments to date. • Identification of potential increases in risk to vessels. • Identification of residual impacts on commercial operations. • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Impacts to ferry routes are described in section 7.9.3 and section 7.9.4. Cumulative impacts are assessed in section 7.11 and within the CRNRA in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.
11 December 2023	IoMSPC Isle of Man Government Consultation Meeting	• Review of engagements and assessments to date. • Identification of potential increases in risk to vessels. • Identification of residual impacts on commercial operations. • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Impacts to ferry routes are described in section 7.9.3 and section 7.9.4. Cumulative impacts are assessed in section 7.11 and within the CRNRA in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
14 December 2023	Stena Line Consultation Meeting	• Review of engagements and assessments to date. • Identification of potential increases in risk to vessels. • Identification of residual impacts on commercial operations. • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Impacts to ferry routes are described in section 7.9.3 and section 7.9.4. Cumulative impacts are assessed in section 7.11 and within the CRNRA in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.
18 December 2023	Trinity House Consultation Meeting	• Review of engagements and assessments to date. • Review of findings of shipping and navigation assessments. • Review of Morgan Generation Assets mitigation measures. • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Applied risk controls are described within section 7.7.1.2 and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.
19 December 2023	MCA Consultation Meeting	• Review of engagements and assessments to date. • Review of findings of shipping and navigation assessments. • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
8th February 2024	MNEF Members MNEF Meeting	• Review of engagements and assessments to date. • Review of findings of shipping and navigation assessments • Cumulative impacts associated with Mooir Vannin Offshore Wind Farm.	A summary of engagement is included in section 7.3. Impacts to navigational safety are described in section 7.9 and an NRA is undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Cumulative impacts are presented in section 7.11 and summarised in Table 7.42. Mooir Vannin Offshore Wind Farm is included within the cumulative assessment in section 7.11.

7.4 Baseline methodology

7.4.1 Relevant guidance

7.4.1.1 The primary guidance for undertaking NRAs for UK offshore wind farms are described below:

- MGN654: Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021). This highlights how to conduct shipping and navigation assessments, the impacts and risk control measures that should be considered
- The assessment has been conducted using the principles of the IMO's Formal Safety Assessment (FSA) (IMO, 2018)
- MGN372: OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022) describes issues to be taken into account when planning and undertaking voyages near offshore renewable energy installations off the UK coast
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) G1162 The Marking of Offshore Man-Made Structures (IALA, 2021) provides guidance on the lighting and marking arrangements for offshore wind farms
- RYA Position of Offshore Renewable Energy Developments: Wind Energy (RYA, 2019) describes key impacts of offshore wind farms on recreational activities
- The World Association for Waterborne Transport Infrastructure (PIANC) WG161 Interaction Between Offshore Wind Farms and Maritime Navigation (PIANC, 2018) provides guidelines and recommendations on impacts and mitigations for shipping routes near offshore wind farms
- Nautical Institute (2013) The Shipping Industry and Marine Spatial Planning provides guidance on benefits and risks of marine spatial planning for shipping and navigation
- G+ IOER (2019) Good practice guidelines for offshore renewable energy developments provides guidance on emergency response for offshore wind farms.

7.4.2 Scope of the assessment

7.4.2.1 The scope of this Environmental Statement has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 7.5.

7.4.2.2 Taking into account the scoping and consultation process, Table 7.5 summarises the issues considered within this assessment.

Table 7.5: Issues considered within this assessment.

Activity	Potential effects scoped into the assessment
Construction/operation and maintenance/decommissioning phases	
Construction, operation and maintenance or decomissioning of surface piercing infrastructure including wind turbines and Offshore Substation Platforms (OSP)	Impact on recognised sea lanes essential to international navigation
	Impact to commercial operators including strategic routes and lifeline ferries
	Impact to adverse weather routeing
	Impact on access to ports and harbours
	Impact on emergency response capability due to increased incident rates and reduced access for SAR responders
	Impact on vessel to vessel collision risk
	Impact on allision (contact) risk to vessels
	Impact on marine navigation, communications and position fixing equipment
	Impact on recreational craft passages and safety
Vessel traffic movements associated with Morgan Generation Assets (including survey, construction, maintenance and decomissioning activities)	Impact on vessel to vessel collision risk
	Impact on allision (contact) risk to vessels
	Impact on emergency response capability due to increased incident rates and reduced access for SAR responders
Laying of inter-array and inter-connector and associated burial or cable protection	Impact on snagging risk to vessel anchors and fishing gear

7.4.2.3 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out, together with justification for scoping them out is presented in Table 7.6.

Table 7.6: Impacts scoped out of the assessment for shipping and navigation.

Potential impact	Justification
Impact on under keel clearance	The depths of water in the shipping and navigation study area are more than 20 m which makes this impact pathway not credible.

7.4.2.4 Potential impact on detection of vessels by Radar Early Warning Systems (REWS) located on oil and gas platforms is considered in Volume 2, Chapter 9: Other sea users of the Environmental Statement.

7.4.3 Methodology to inform baseline

7.4.3.1 To characterise the baseline environment for the shipping and navigation study area (see section 7.4.4) a range of data sources have been collated and reviewed, in addition to feedback from project-specific consultation and site-specific surveys. Further information on data sources is included within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.4.4 Study area

7.4.4.1 The shipping and navigation study area consists of waters within 10 nm of the Morgan Array Area, as shown in Figure 7.1. The shipping and navigation study area has been discussed and agreed with key stakeholders during consultation (see section 7.3).

7.4.4.2 Additionally, the waters of the east Irish Sea to the south and east of the Isle of Man (south of 54.5 degrees north and east of 5.0 degrees west) have been considered in terms of shipping routes and their interaction with the Morgan Generation Assets and existing and planned offshore wind projects within this area for the CEA.

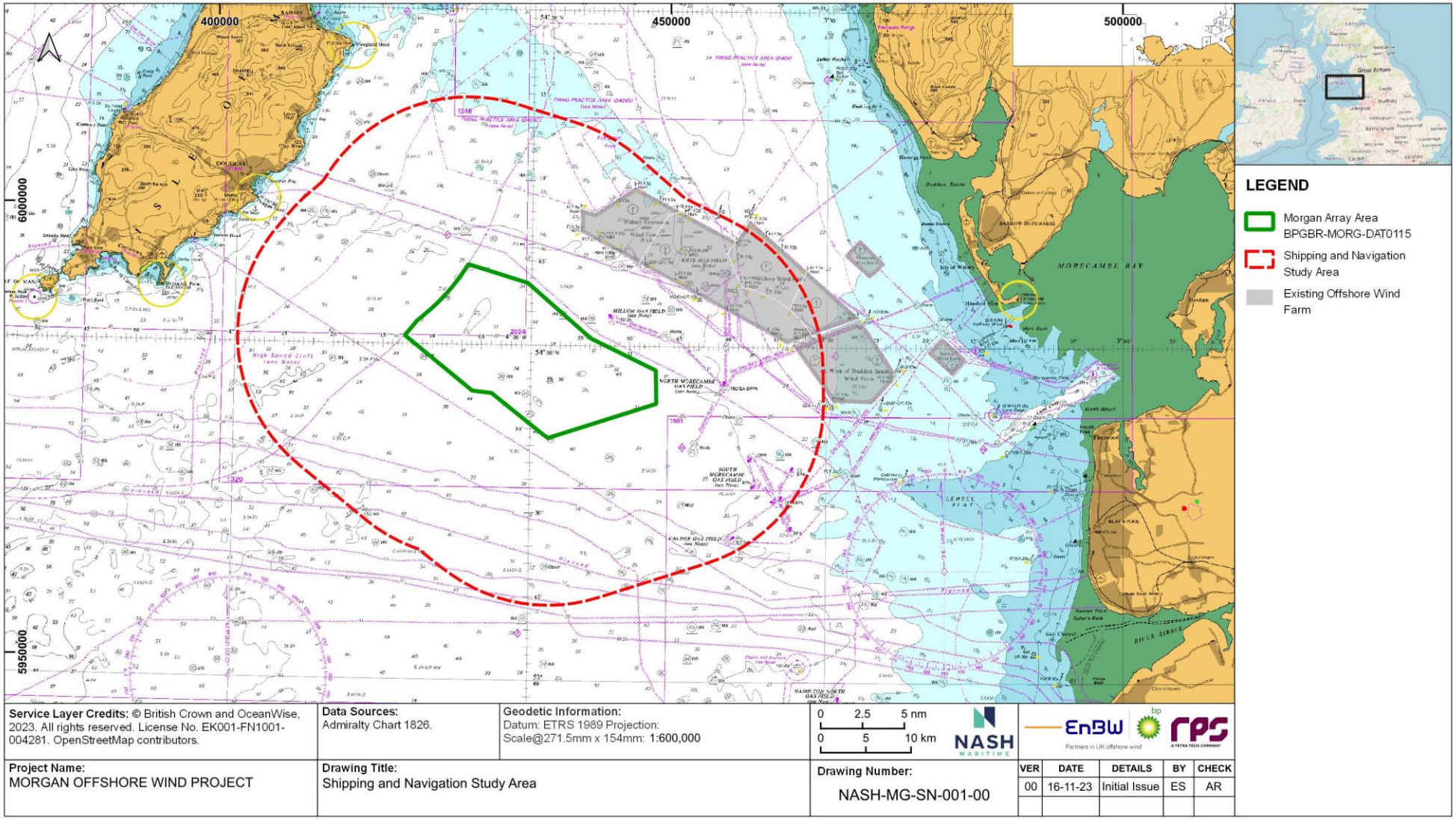


Figure 7.1: Shipping and navigation study area.

7.4.5 Desktop study

7.4.5.1 Information on shipping and navigation within the shipping and navigation study area was collected through a detailed desktop review of existing studies and datasets. These are summarised at Table 7.7 below.

7.4.6 Site specific surveys

7.4.6.1 In order to inform this Environmental Statement, site-specific surveys were undertaken, as agreed with the statutory consultees (see Table 7.4 for further details). A summary of the surveys undertaken to inform the shipping and navigation impact assessment is outlined in Table 7.8 below.

Table 7.7: Summary of key desktop data sources/reports.

Title/Dataset	Source	Year	Author
High fidelity data from the Automatic Identification System (AIS) for the Irish Sea for 2019	MarineTraffic	2019	MarineTraffic
High fidelity data from AIS for the Irish Sea for 2022	MarineTraffic	2022	MarineTraffic
Anonymised AIS Data for UK waters for 2019	MMO	2019	MMO
Vessel density grids for 2021	EMODNet	2021	EMODNet
RYA Coastal Atlas	RYA	2022	RYA
Vessel Monitoring System (VMS) data for 2019	MMO	2019	MMO
Department for Transport (DfT) shipping statistics	DfT	2023	DfT
Marine Accident Investigation Branch (MAIB) incident data	MAIB	1992-2021	MAIB
Royal National Lifeboat Institute (RNLI) incident data	RNLI	2008-2019	RNLI
DfT SAR helicopter taskings	DfT	2022	DfT
G+ accident data	G+	2013-2022	G+
Marine aggregate dredging licenses	Crown Estate	2023	Crown Estate
Offshore renewables	Crown Estate	2023	Crown Estate
Industrial infrastructure (wind turbines, oil and gas, cables etc.)	Oceanwise	2023	Oceanwise
Oil and gas infrastructure	Oil and Gas Authority	2023	Oil and Gas Authority
Admiralty Charts	Admiralty	2023	Admiralty
Admiralty Sailing Directions	Admiralty	2023	Admiralty
Passage plans provided by Irish Sea ferry operators	Various	2022	IoMSPC, Stena Line, Seatruck and P&O
Tidal data	Admiralty Total Tide	2022	Admiralty
Metocean data	Morgan Offshore Wind Project	2021	Morgan Offshore Wind Project

Table 7.8: Summary of site-specific survey data.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Winter vessel traffic survey	Morgan Array Area plus 10 nm	AIS, radar and visual observations collected as part of the 14 day marine traffic survey, as required in MGN654.	NASH Maritime	21 November 2021 to 05 December 2021	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Summer vessel traffic survey	Morgan Array Area plus 10 nm	AIS, radar and visual observations collected as part of the 14 day marine traffic survey, as required in MGN654.	NASH Maritime	15 July 2022 to 29 July 2022	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Fishing season vessel traffic survey	Morgan Array Area plus 10 nm	AIS, radar and visual observations collected as part of the 14 day marine traffic survey, as required in MGN654 to better understand fishing activity around the Morgan Array Area.	NASH Maritime	04 May 2023 to 18 May 2023	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Top up vessel traffic survey	Morgan Array Area plus 10 nm	AIS, radar and visual observations collected as part of the 14 day marine traffic survey, as required in MGN654 to extend data validity.	NASH Maritime	11 November 2023 to 27 November 2023	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform PEIR: IoMSPC	Irish Sea	Full bridge simulations of ferry passages through the Irish Sea were commissioned by the Applicant. The aim of the simulations was to understand, in more detail, potential navigation impacts of the PEIR boundaries of the Morgan Generation Assets, Mona and Morecambe Offshore Wind Projects on existing commercial ferries and to test the viability and safety of commercial ferry transits through routes between the offshore wind farms in normal and adverse weather conditions. These were attended by representatives from the IoMSPC, Seatruck and Stena	HR Wallingford/NASH Maritime	21 and 22 July 2022 16 to 19 July 2022	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform PEIR: Stena	Irish Sea		HR Wallingford/NASH Maritime	11 and 12 August 2022 23 to 25 August 2022	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Navigation simulations to inform PEIR: Seatruck	Irish Sea	Line, including masters, who generously provided their time and expertise by participating in the simulations.	HR Wallingford/NASH Maritime	08 and 09 September 2022	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform PEIR: P&O	Irish Sea	P&O declined attendance at the navigation simulations, therefore a dedicated session to assess impacts on P&O routes was undertaken by the project team.	HR Wallingford/NASH Maritime	26 August 2022	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform Environmental Statement: IoMSPC	Irish Sea	The navigation simulations were repeated with the respective ferry companies to re-test the impacts on navigation and safety following commitments made by the Morgan Generation Assets, Mona and Morecambe Offshore Wind Projects, including boundary changes. In addition, the assessments considered a more detailed understanding of fishing activity and night time simulations. The presence of the proposed Mooir Vannin Offshore Wind Farm was included in the IoMSPC simulations.	HR Wallingford/NASH Maritime	13 to 15 September 2023 (with Steam Packet) 12 to 14 June 2023 (without Steam Packet)	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform Environmental Statement: Stena	Irish Sea		HR Wallingford/NASH Maritime	23 to 25 May 2023	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.
Navigation simulations to inform Environmental Statement: Seatruck	Irish Sea		HR Wallingford/NASH Maritime	22 to 23 June 2023	Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.5 Baseline environment

7.5.1 Introduction

7.5.1.1 A full assessment of the baseline environment for shipping and navigation is provided in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement, including details of navigational features, maritime incidents, and an assessment of the marine traffic baseline. This section provides a summary of the key findings from the assessment of the baseline environment in the NRA and therefore both documents should be read in parallel. This section is intended to provide an overview of the baseline environment relevant to shipping and navigation and does not provide any additional information over that presented in the NRA. Key features relevant to the Morgan Generation Assets and features relating to the management of vessels and safety of navigation are described in this section.

7.5.2 Description of the marine environment

7.5.2.1 Figure 7.2 presents the principal navigational activities in proximity to the Morgan Array Area. Two IMO adopted routeing measures are located in the Irish Sea, the Liverpool Bay TSS and the Off Skerries TSS. Both TSSs are located more than 20 nm from the Morgan Array Area. There are no reporting measures within the shipping and navigation study area.

7.5.2.2 Two north cardinal marks lie to the north and two south cardinal marks lie to the south of the Walney offshore wind farm and within the 10 nm shipping and navigation study area. The Duddon Sands SW south cardinal mark lies just outside the shipping and navigation study area to the west. All other AtoNs within the shipping and navigation study area are fixed on offshore structures such as oil and gas platforms and wind turbines.

7.5.2.3 Three operational offshore wind projects lie within the 10 nm shipping and navigation study area, namely Walney and Walney Extension offshore wind farms at 4.4 nm and West of Duddon Sands offshore wind farm at 8.3 nm. There are four hydrocarbon fields within the shipping and navigation study area, these are Millom Gas Field (1 nm north), North Morecambe Gas Field (4 nm east), South Morecambe Gas Field (7 nm southeast) and Calder Gas Field (9 nm southeast). Further offshore wind farms and oil and gas infrastructure exist outside the shipping and navigation study area but within the east Irish Sea.

7.5.2.4 There are no charted anchorages within the shipping and navigation study area. Douglas Bay is used as an anchorage for vessels waiting to enter the Port of Douglas and for cruise vessels when undertaking tendering operations. Main shipping anchorages are located adjacent to the Port of Liverpool and to the east of Anglesey.

7.5.2.5 There are no ports or harbours within the shipping and navigation study area, although the Douglas Harbour Control Limit intersects the extreme northwest of the shipping and navigation study area. The largest nearby port is the Port of Liverpool, located 40 nm southeast of the Morgan Array Area.

7.5.2.6 One cable passes through the Morgan Array Area, namely the Isle of Man to England Interconnector (E-LLAN) used for importing and exporting electricity between the Isle of Man and the mainland. Immediately adjacent to the Morgan Array Area are two telecommunications cables, operated by Vodafone to the south (Lanis 1) and BT to the north (BT-MT1). In addition, there are multiple other cables within the shipping and

navigation study area, both international and associated with the existing offshore wind farms.

7.5.2.7 There are no aggregate extraction areas in the shipping and navigation study area, with the nearest 19 nm to the southeast.

7.5.2.8 There are no active spoil or disposal grounds in the shipping and navigation study area.

7.5.2.9 The predominant wind direction is from the southwest, and accounts for the greatest proportion of strong wind events. The Admiralty Sailing Directions state that gales are reported between 12 days/year (at Walney) and 30 days/year (at Ronaldsway). Wave conditions are predominately southwesterly with monthly significant wave heights (Hs) of 2.9 m and annual significant wave heights of 4.2 m. There are limited tidal currents within the shipping and navigation study area, with spring flows less than 1.5 m/s.

7.5.2.10 The Admiralty Sailing Directions report fog conditions between 12 days/year (at Crosby) and 24 days/year (at Ronaldsway).

7.5.2.11 His Majesty's Coastguard (HMCG) is responsible for requesting and coordinating SAR activities within the UK's SAR region. The local coastguard base for the region is Holyhead Coastguard Operations Centre. The nearest HMCG helicopter base is located at Caernarfon Airport, Gwynedd. The Caernarfon facility provides a 24-hour SAR service, with two Sikorsky S-92 helicopters.

7.5.2.12 There are 19 RNLI lifeboat stations within the east Irish Sea. The nearest lifeboat station is Douglas, situated 12 nm northwest of the Morgan Array Area and equipped with a Mersey class all-weather lifeboat.

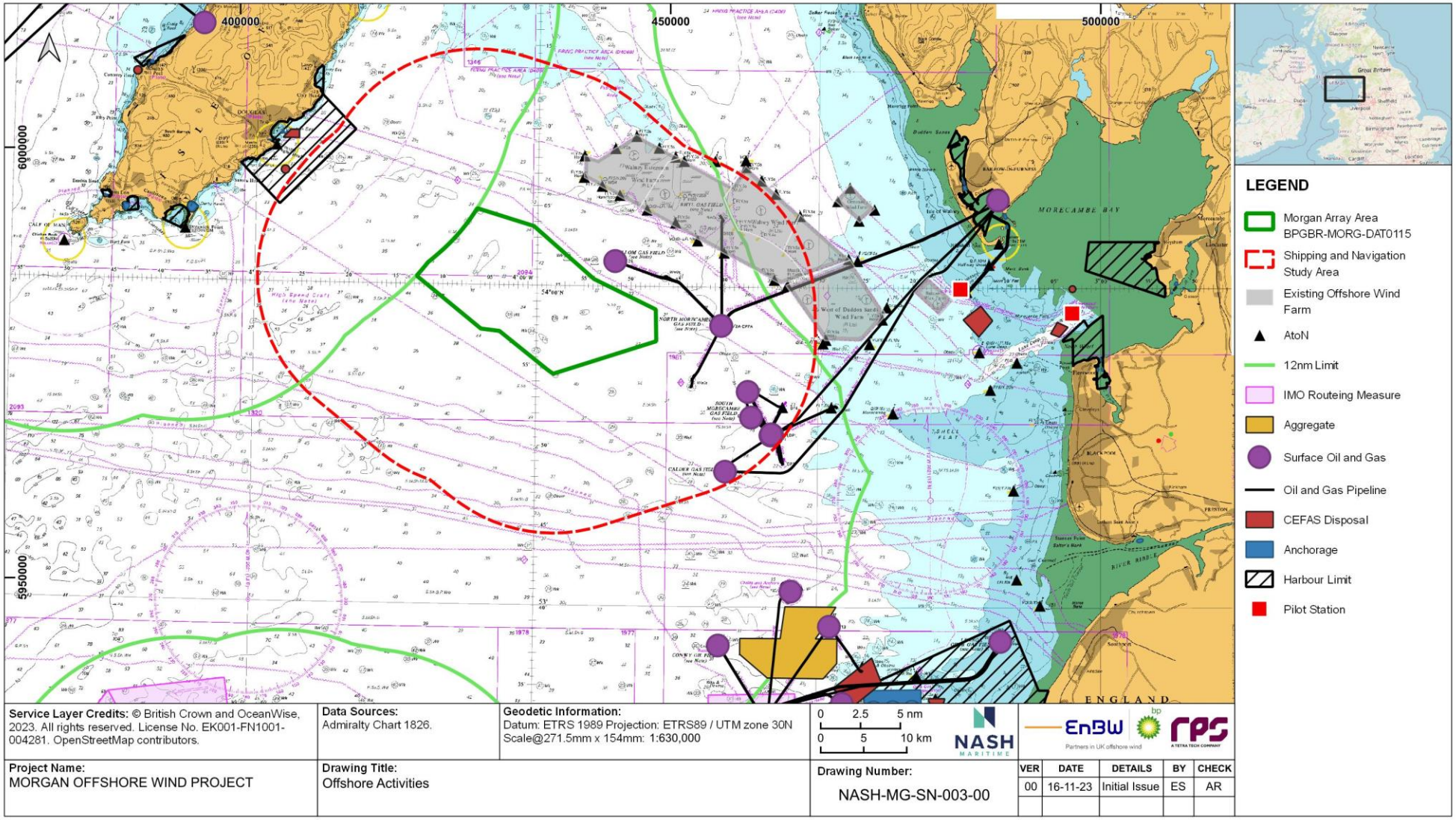


Figure 7.2: Offshore activities.

7.5.3 Vessel Traffic

7.5.3.1 This section presents a summary of the vessel traffic analysis undertaken in Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.5.3.2 Analysis of vessel traffic has been conducted using data collected from four 14-day vessel traffic surveys between 2021 and 2023, and a year of 2022 AIS data. Table 7.9 provides a summary of the vessel traffic surveys.

7.5.3.3 Figure 7.3 and Table 7.9 show that cargo, fishing, passenger, tanker, tug and service vessels were recorded by AIS and radar throughout the year, whilst recreational vessels were only recorded during the summer and May surveys. Fishing vessel activity was greatest during the winter and May surveys, particularly to the northwest of the Morgan Array Area associated with the Isle of Man queen scallop fisheries. Whilst at times there were up to ten boats recorded within this fishery, their activity did not extend into the Morgan Array Area itself.

7.5.3.4 Annualised vessel traffic density from 2022 AIS data is shown in Figure 7.4, which presents the number of vessel transits through each grid cell. Figure 7.4 shows the Morgan Array Area in relation to the general shipping routes within the Irish Sea. The key vessel traffic route in the shipping and navigation study area is between the Port of Liverpool and a waypoint two nautical miles southwest of the Isle of Man which passes along the southwest boundary of the shipping and navigation study area. Multiple ferry routes intersect the Morgan Array Area, these include the routes between Heysham, Liverpool, Belfast, Douglas and Warrenpoint. Routes between Heysham to Dublin and Heysham to Belfast pass through the shipping and navigation study area but not the Morgan Array Area. Vessel traffic activity shows a seasonal trend that peaks over the summer months (May to August) and decreases in the winter months (November to February). This is primarily due to an increase in ferry service operations and recreational activity.

7.5.3.5 Vessels of all sizes navigate within the shipping and navigation study area. However, the majority of large (>200 m) and deep-draught (>10 m) vessels navigate to the southwest of the shipping and navigation study area on route to the Port of Liverpool. Only occasional transits of vessels greater than this size are recorded loitering or conducting pilot transfers offshore of Douglas on the Isle of Man. The majority of vessels greater than 100 m within the shipping and navigation study area are ferries rather than commercial cargo or tankers.

7.5.3.6 There were 452 cargo ship transits through the shipping and navigation study area during 2022, of which 138 passed through the Morgan Array Area, less than one a day. These are mostly general cargo vessels of less than 100 m in length. The majority of cargo ship transits are shown to be between the west of the Isle of Man and Liverpool, passing outside of the shipping and navigation study area. These tend to include larger vessels such as container ships and bulk carriers. Tanker vessel tracks are largely consistent with the shipping routes identified for cargo ships, albeit with less frequency with 157 transits through the shipping and navigation study area in 2022 and 67 through the Morgan Array Area. Of these, the 77 m Keewhit and various 90 m to 100 m Stolt vessels account for the majority. These vessels are operating between Liverpool, Douglas, Belfast and Silloth.

Table 7.9: Summary of vessel traffic surveys.

Attributes	Winter	Summer	Fishing Survey	Top Up Survey
Survey vessel	Karelle (28 m Fishing Vessel)	Morning Star (23 m Fishing Vessel)	Karelle (28 m Fishing Vessel)	Morning Star (23 m Fishing Vessel)
Dates	00:00 21 November 2021 to 00:00 05 December 2021	17:00 15 July 2022 to 17:00 29 July 2022	03:25 04 May 2023 to 03:25 18 May 2023	15:00 11 November 2023 to 06:00 27 November 2023
Downtime	None	None	None	07:00 13 November 2023 to 20:36 14 November 2023
Survey Area	Morgan Array Area + 10 nm	Morgan Array Area + 10 nm	Morgan Array Area + 10 nm	Morgan Array Area + 10 nm
Total Vessels:	**Morgan Array Area + 10 nm**: 649 (46.4/day) **Morgan Array Area**: 150 (10.7/day)	**Morgan Array Area + 10 nm**: 426 (30.4/day) **Morgan Array Area**: 193 (13.8/day)	**Morgan Array Area + 10 nm**: 510 (36.4/day) **Morgan Array Area**: 163 (11.6/day)	**Morgan Array Area + 10 nm**: 343 (24.5/day) **Morgan Array Area**: 169 (12.1/day)
Cargo	**Morgan Array Area + 10 nm**: 29 (2.1/day) **Morgan Array Area**: 12 (0.9/day)	**Morgan Array Area + 10 nm**: 20 (1.4/day) **Morgan Array Area**: 7 (0.5/day)	**Morgan Array Area + 10 nm**: 23 (1.6/day) **Morgan Array Area**: 8 (0.6/day)	**Morgan Array Area + 10 nm**: 21 (1.5/day) **Morgan Array Area**: 10 (0.7/day)
Fishing	**Morgan Array Area + 10 nm**: 220 (15.7/day) **Morgan Array Area**: 18 (1.3/day)	**Morgan Array Area + 10 nm**: 43 (3.1/day) **Morgan Array Area**: 30 (2.1/day)	**Morgan Array Area + 10 nm**: 135 (9.6/day) **Morgan Array Area**: 23 (1.6/day)	**Morgan Array Area + 10 nm**: 43 (3.1/day) **Morgan Array Area**: 29 (2.1/day)
Passenger	**Morgan Array Area + 10 nm**: 150 (10.7/day) **Morgan Array Area**: 88 (6.3/day)	**Morgan Array Area + 10 nm**: 206 (14.7/day) **Morgan Array Area**: 129 (9.2/day)	**Morgan Array Area + 10 nm**: 215 (15.4/day) **Morgan Array Area**: 119 (8.5/day)	**Morgan Array Area + 10 nm**: 165 (11.8/day) **Morgan Array Area**: 110 (7.9/day)
Recreational	None	**Morgan Array Area + 10 nm**: 20 (1.4/day) **Morgan Array Area**: 14 (1/day)	**Morgan Array Area + 10 nm**: 16 (1.1/day) **Morgan Array Area**: 1 (0.1/day)	None
Tanker	**Morgan Array Area + 10 nm**: 24 (1.7/day) **Morgan Array Area**: 4 (0.3/day)	**Morgan Array Area + 10 nm**: 11 (0.8/day) **Morgan Array Area**: 4 (0.3/day)	**Morgan Array Area + 10 nm**: 3 (0.2/day) **Morgan Array Area**: 2 (0.1/day)	**Morgan Array Area + 10 nm**: 8 (0.6/day) **Morgan Array Area**: 3 (0.2/day)
Tug and Service	**Morgan Array Area + 10 nm**: 225 (16.1/day) **Morgan Array Area**: 28 (2.0/day)	**Morgan Array Area + 10 nm**: 124 (8.9/day) **Morgan Array Area**: 8 (0.6/day)	**Morgan Array Area + 10 nm**: 114 (8.1/day) **Morgan Array Area**: 11 (0.8/day)	**Morgan Array Area + 10 nm**: 95 (6.8/day) **Morgan Array Area**: 8 (0.6/day)

7.5.3.7 Ferry routes, including passenger and freight services, are shown in Figure 7.5. There are ten ferry routes that navigate through the shipping and navigation study area, split between three operators. Ferry vessel routes and annual crossings by operator are presented in Table 7.10. On average, between 14 and 15 ferry transits per day passed through the shipping and navigation study area, a total of 5,304 in 2022. 3,323 of these passed through the Morgan Array Area, a rate of 9.1 per day. Four principal operators are identified in the east Irish Sea. The IoMSPC operate routes between Douglas, Liverpool and Heysham. Seatruck operate routes between Heysham, Liverpool, Warrenpoint and Dublin. Stena operate routes between Liverpool, Heysham and Belfast. P&O operate routes between Liverpool and Dublin, however these routes are outside of the shipping and navigation study area.

7.5.3.8 A total of 31 cruise ship transits were recorded passing through the shipping and navigation study area during 2022, of which 14 passed through the Morgan Array Area. Cruise vessel activity in the area is centred around the Ports of Liverpool and Douglas and was concentrated seasonally between April and September.

7.5.3.9 There is little recreational activity within the Morgan Array Area, with most recreational activity occurring along the coast, particularly near to Morecambe Bay and the coast of the Isle of Man. Offshore cruising routes are evident between Liverpool and Douglas and between the Menai Straits and Douglas, passing through the shipping and navigation study area. Relatively few yachts were recorded during the vessel traffic surveys, with less than one per day during the summer survey and none at all recorded during the winter survey indicating strong seasonality.

Table 7.10: Ferry routes and annual crossings by operator.

Operator	Route	Example vessels (2019 to 2022)	Approximate annual crossings (2022)
IoMSPC	HEY – DOUG	Ben-my-Chree	1,451
	LIV – DOUG	Manannan	590
Stena Line	LIV – BEL W IoM	Stena Edda, Stena Embla, Stena Mersey, Stena Horizon, Stena Lagan, Stena Forecaster, Stena Forerunner	1,442
	LIV – BEL E IoM West of Calder Gas Field		194
	LIV – BEL E IoM East of Calder Gas Field		196
	HEY – BEL	Stena Hibernia, Stena Scotia	1,094
Seatruck	HEY – WAR	Seatruck Performance, Seatruck Precision	1,099
	HEY – DUB	Seatruck Pace, Seatruck Panorama	606
	LIV-DUB	Seatruck Pace, Seatruck Power, Seatruck Panorama, Seatruck Progress	1,627
P&O	LIV-DUB	Mistral, Norbay, Norbank	1,625

7.5.3.10 Commercial fishing in the east Irish Sea region has a wide spatial distribution and targets a number of valuable fisheries for demersal, pelagic and shellfish species. Key

shellfish species include; king scallop, and queen scallop which are targeted by dredges; and whelk, lobster and crab, which are targeted by pots. The most important demersal target species include bass, sole, thornback ray and plaice, which are typically caught by beam and otter trawlers. Pelagic fish landings from this area are mainly of herring and mackerel, which are predominantly caught by pelagic trawls. Fishing ports in the region with the highest fishing efforts are Amlwch, Conwy, Holyhead and Fleetwood. Fishing vessels are also active from Annan, Douglas, Kilkeel, Kirkudbright, Maryport and Peel. In addition, Belgian trawlers are known to operate throughout the shipping and navigation study area.

7.5.3.11 There is considerable fishing activity within and near the Morgan Array Area, including vessels up to 40 m in length engaged in mobile and static gear fishing. However, some fishing vessels are engaged in guard vessel duties or other survey works and account for some of the concentrations around oil and gas installations. During the vessel traffic surveys, between 0.5 and two fishing vessels per day were identified within the Morgan Array Area. Significant fishing activity was recorded during the winter and May vessel traffic surveys to the northwest of the Morgan Array Area, associated with the Isle of Man Queen Scallop fishing season. At times, up to 10 concurrent fishing boats were working these waters. Additional data on fishing activity is contained within the Morgan Generation Assets fisheries chapter (Volume 4, Annex 6.1: Commercial fisheries technical report of the Environmental Statement).

7.5.3.12 Crew Transfer Vessels (CTVs) operating between operations and maintenance bases and the existing offshore wind farms are mostly clear of the Morgan Array Area, except when relocating on less routine transits, particularly to Douglas. Oil and gas associated supply ships and standby safety vessels have a high intensity to the east of the shipping and navigation study area where the platforms are located. In particular, the Millom and South Morecambe Gas Fields. The activities of dredgers and pilot vessels are concentrated to the southeast of the shipping and navigation study area. SAR vessels are dispersed throughout the shipping and navigation study area, but mostly in coastal waters. Other vessel types, including survey vessels and tugs, are concentrated inshore, with relatively few intersecting the Morgan Array Area compared to other vessel types.

7.5.3.13 Cargo/tanker shipping routes with more than one vessel movement per day within the shipping and navigation study area are all to/from the Port of Liverpool and are clear of the Morgan Array Area. There are numerous cargo/tanker routes with less than one vessel per day passing through or adjacent to the Morgan Array Area. These include routes into Heysham and Douglas and alternative routes to/from Liverpool from the east of the Isle of Man. Most of these routes have less than one cargo/tanker vessel transit per week. Analysis of vessel tracks during MetOffice named storm events did not identify any repeatable adverse weather routeing by cargo/tanker shipping. However, during strong southwesterlies, the anchorage to the east of Anglesey was in greater demand by vessels.

7.5.3.14 Figure 7.5 shows the non-typical routes taken by ferries, including during adverse weather conditions. The 90th percentile corridor within which 90% of vessel tracks are contained, as defined in MGN654, has been used to show the principal routes. Prevailing southwesterlies result in vessels taking a more southwesterly transit in order to both control the course relative to the conditions and take advantage of the lee from the shore. This minimises dangerous motions aboard the vessel and improves passenger comfort.

7.5.3.15 There is limited evidence of anchoring or loitering within the shipping and navigation study area, the former concentrated in Douglas Bay and the latter to the southwest of the Morgan Array Area.

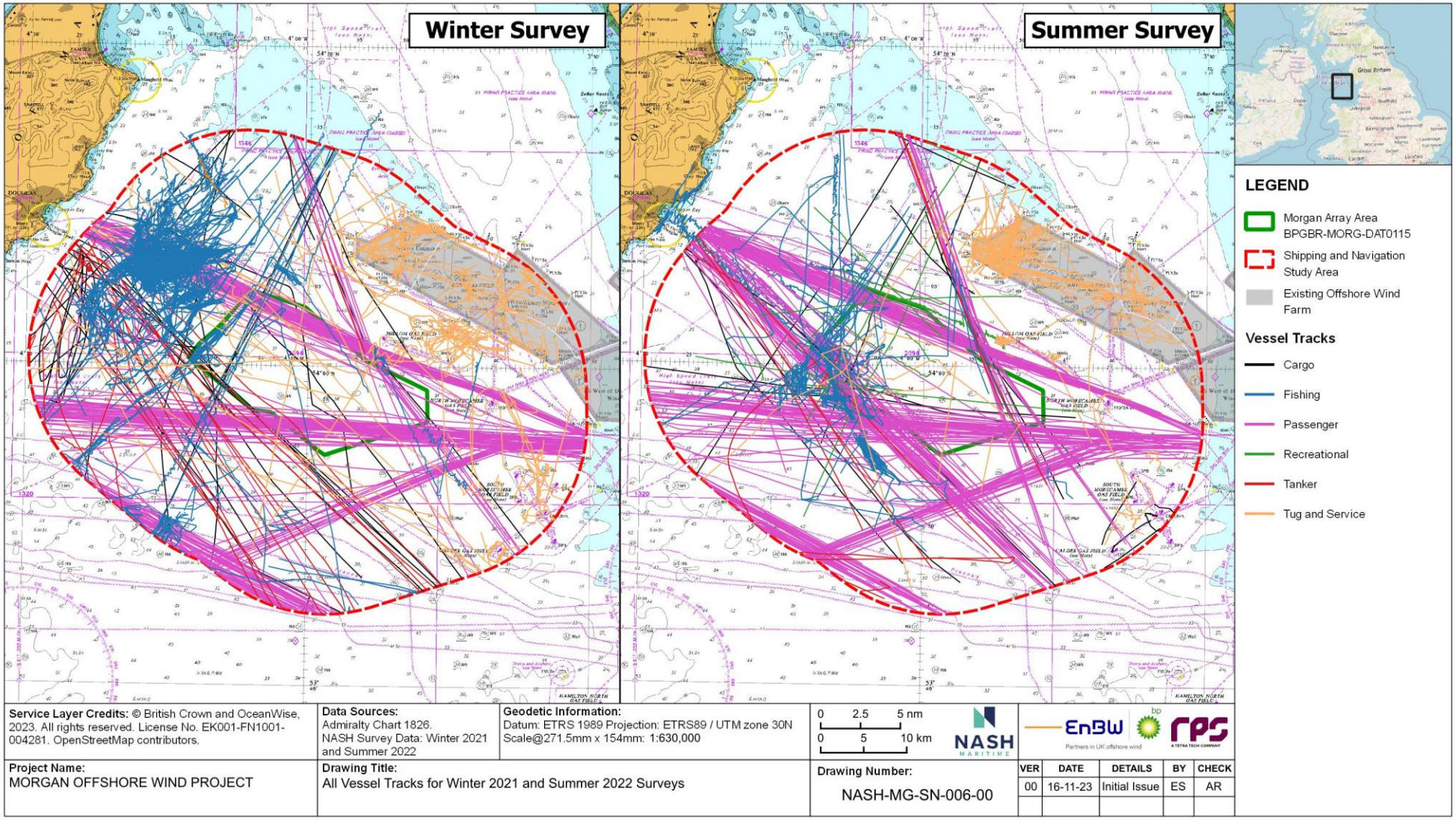


Figure 7.3: Vessel traffic survey (Source: vessel traffic surveys; winter November/December 2021; summer July 2022).

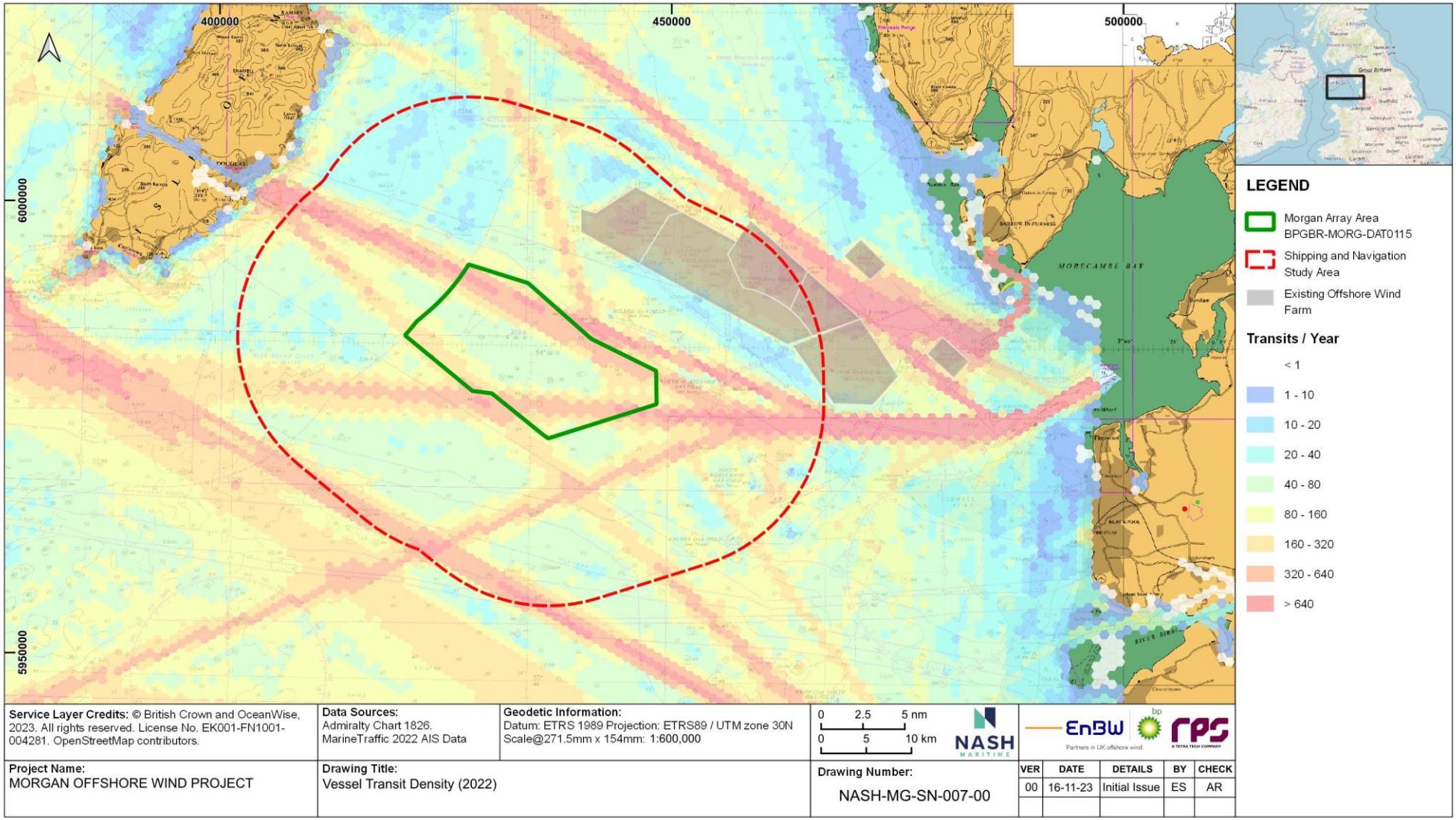


Figure 7.4: Vessel transit density (Source: MarineTraffic, 2022).

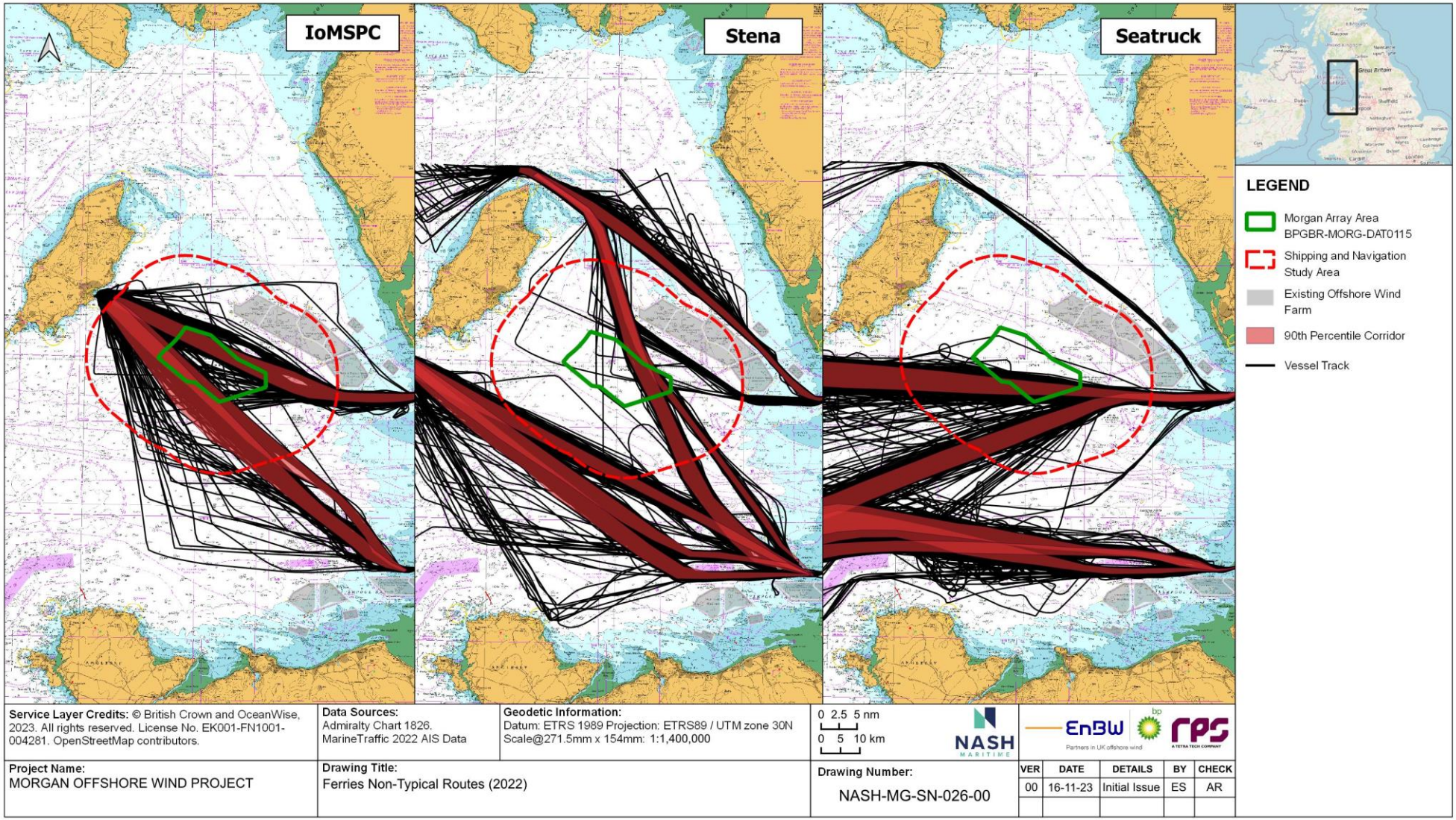


Figure 7.5: Ferries non-typical routes (Source: MarineTraffic, 2022).

7.5.3.16 During consultation, it was identified that during strong northwesterlies, it was common for vessels to undertake pilotage transfers in the lee of the Isle of Man at Douglas, rather than at Liverpool. Through analysis of 2022 AIS data, vessels considered to have conducted this behaviour include 50 tankers, eight cruise ships and 18 cargo ships. It is notable that during significant adverse weather events, these transfers can result in convoys of vessels navigating between Liverpool and Douglas.

7.5.4 Historical Incidents

7.5.4.1 A baseline of historical maritime incidents within the shipping and navigation study area has been established through a review of MAIB and RNLI databases, reports and news reports. These are presented within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.5.4.2 Eight incidents were recorded within the Morgan Array Area between 1992 and 2022. These include:

- Two fire/explosions abord a fishing vessel and passenger vessel
- Three mechanical/damage incidents (such as fouled propellor) aboard fishing and recreational vessels
- A near miss involving a passenger vessel
- Two personal injuries abord tug and service/fishing vessels.

7.5.4.3 98 incidents were recorded within the 10 nm shipping and navigation study area. The majority of these were non-navigationally significant hazards such as 37 mechanical failures and 22 personal injuries. The most notable included:

- Three collisions, typically involving fishing and tug and service vessels
- Three contacts, two of which involved CTVs in contact with the existing offshore wind farms and one involving a fishing vessel
- Capsize of the fishing vessel Solway Harvester in bad weather to the northwest of the Morgan Array Area with the loss of seven lives (MAIB Report 1/2006).

7.5.4.4 In addition, near to the shipping and navigation study area, the grounding and loss of the Riverdance occurred on 31 January 2008. A 116 m Seatruck Ferries Ro-Ro sustained a severe list to port in heavy seas off Lune Deep causing the vessel to drift and subsequently run aground off Blackpool. There were no injuries or pollution but as salvage attempts failed it was declared a total constructive loss and broken up for removals.

7.5.4.5 For the most recent years of data (2008-2022), accident rates per year for all vessels within 10 nm of the Morgan Array Area show a very low incident rate, particularly for large commercial vessels (see Table 7.11).

Table 7.11: MAIB/RNLI incident frequencies within 10 nm per year (2008-2020).

Incident Type	Cargo	Fishing	Passenger	Recreational	Tanker	Tug and Service	Total
Collision	0.00	0.07	0.00	0.00	0.00	0.13	0.2
Contact	0.00	0.07	0.00	0.00	0.00	0.13	0.20
Grounding	0.00	0.00	0.00	0.07	0.00	0.00	0.07
Other	0.07	2.40	0.20	2.07	0.00	0.80	5.54
Total	0.07	2.54	0.2	2.14	0.00	1.06	6.01

7.5.4.6 To better understand the types and frequency at which navigational incidents might occur with the proposed Morgan Generation Assets, analysis was conducted of historical accidents associated with UK operational offshore wind farms. Analysis was conducted of the MAIB database (2010 to 2019), RNLI databases (2008 to 2019), MAIB reports and news reports.

7.5.4.7 In total, 69 incidents were identified between 2010 and 2019. This includes six collisions between vessels, 29 allisions of a vessel with a fixed structure, 21 groundings and 13 near misses. Where the information is available, 36% occurred within the offshore wind farm array boundary, 43% occurred within ports or harbours and 20% occurred on-transit between the two. 82% of incidents involved project craft (such as CTVs or construction vessels). Few allisions are recorded by a non-project vessel, however, anecdotally there have been more allisions involving fishing and recreational vessels which are not reported in the dataset.

7.5.4.8 Incident rates for an average project are derived from the historical incident records and using an estimate of the number of years of operation for UK offshore wind farms, (Table 7.12) (Rawson and Brito, 2022). The incident return rates are generally low, between 10 and 45 operational years between incidents, the majority accounted for by project vessels and have a low consequence, without loss of life or serious pollution. Therefore, over a typical 25 to 35 year operational duration it would be expected that a typical project would experience three allisions, two groundings and one collision or near miss. It is notable that there are no recorded accidents involving large commercial shipping vessels and offshore wind farms in the UK. Nor did any of the recorded navigational incidents across the UK sector result in loss of life.

Table 7.12: Average incident rate per project between 2010-2019 in UK.

Incident Type	Number	Rate	Return Period (Years)
Collision	6	0.022	45.4
Grounding	21	0.077	13.0
Near Miss	13	0.048	20.9
Total Allision	29	0.107	9.4
CTV Allisions	27	0.099	10.1
Fishing Allisions	2	0.007	136.9
Total	69	0.254	3.9

7.5.5 Future baseline scenario

7.5.5.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require a future baseline scenario to be presented within the Environmental Statement, defined as, '*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*'. In the event that Morgan Generation Assets does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

7.5.5.2 The future baseline scenario has been considered within the shipping and navigation study area for commercial, ferry, oil and gas, fishing and recreational vessel traffic. Further details on the development of the future baseline are presented within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement.

7.5.5.3 In terms of cargo/tanker shipping trade, analysis of DfT data on UK port trade show a decline in port freight in 2020 at both national and port level. The DfT report that UK ports were affected by measures to prevent and reduce the global spread of Covid-19 throughout 2020, as well as the UK exiting the European Union at the end of 2020. The DfT report a 9% decrease in tonnage handled by UK ports in 2020 compared to 2019. However, given the lifting of COVID-19 related restrictions, it is anticipated that port freight will continue to return to pre-pandemic levels.

7.5.5.4 In 2019, the DfT produced data for projected freight traffic into UK major ports (DfT, 2019). Overall, port traffic is forecast to remain relatively flat in the short term but grow in the long term, with tonnage 39% higher in 2050 compared to 2016. Additionally, the Douglas Harbour Master Plan (Isle of Man Government, 2018) considers the potential for development of a day-call cruise ship berth, which might increase the number of cruise ship calls to the Isle of Man. Other future changes that might occur by 2035 could include the use of more autonomous vessels within UK waters.

7.5.5.5 Freight and passenger ferries account for a large proportion of vessel movements within the shipping and navigation study area. These routes are subject to change both in terms of schedule, vessels and the addition of new routes in order to meet market demand. Prior to COVID-19, passenger numbers on relevant Irish Sea routes were relatively stable across most routes. There has been a noted increase in Irish Sea freight movements during the same period. A modernisation programme is ongoing between different operators to replace vessels operating within the shipping and navigation study area. Whilst passenger numbers were significantly affected by the

COVID-19 pandemic for 2020 and 2021, 2022 numbers show a return to pre-pandemic numbers, with the exception of the Stena Liverpool to Belfast route which shows a significant increase. In 2023, the IoMSPC new ferry Manxman started operating between Heysham and Douglas and it was indicated through consultation with IoMSPC that it is anticipated that this vessel will start operating between Liverpool and Douglas all year round from 2024.

7.5.5.6 A review of available information for fishing and recreational activity does not suggest there would be a substantial change in activity from the baseline. Fishing effort can be highly variable, both spatially and temporally, but a need to maintain stock levels of a finite resource would suggest that any great increase in fishing effort would be unsustainable. Surveys of recreational participation conducted by the RYA has not suggested any notable increase, and more recently has suggested a downturn.

7.5.5.7 In the absence of definitive information, an assumption is made that recreational activity, fishing activity and ferry routes and schedules will be similar in 2035 as to the existing baseline environment. For the purposes of this assessment, a 15% increase in vessel traffic has been assumed for the future baseline scenario.

7.5.5.8 Irish Sea oil and gas platforms are reaching end of life and it is understood that some platforms may be decommissioned. Details of which platforms and when decommissioning will likely occur have not been fully ascertained by the Applicant but engagement is ongoing to coexist with their decommissioning plans. Consultation with oil and gas operators has indicated that Millom West (Harbour Energy) will be decommissioned by 2030. The South Morecambe gas field platforms are also expected to cease production before 2029 (Spirit Energy, 2019).

7.5.6 Data limitations

7.5.6.1 Since early 2020, the COVID-19 pandemic has substantially impacted recreational and commercial vessel movements both globally and locally. It is therefore possible that data collected between 2020 and 2022 may be influenced by the pandemic although vessel traffic is expected to have largely returned to pre-pandemic levels. Where appropriate, datasets have been used that precede the pandemic to benchmark those collected more recently, and in order to provide a representative overview of the baseline vessel traffic activity. In addition, following the PEIR, a 2022 AIS dataset has been obtained to provide greater recency for the analysis. This was agreed with the MCA and key stakeholders during consultation as a suitable mitigation to the impacts of COVID-19.

7.5.6.2 AIS is not necessarily required on all recreational or fishing vessels, dependent on size. AIS analysis alone would therefore underestimate the extent of these activities. The vessel traffic survey using visual and radar observations has been combined with secondary sources (such as VMS or the RYA Coastal Atlas) and consultation to complete the picture of small craft vessel movements.

7.6 Impact assessment methodology

7.6.1 Overview

7.6.1.1 The shipping and navigation impact assessment has followed the methodology set out in Volume 1, Chapter 5: Environmental Impact Assessment (EIA) methodology of the Environmental Statement. Specific to the shipping and navigation impact assessment, the following guidance documents have also been considered:

- MGN654 and its annexes (MCA, 2021)

- IMO FSA (IMO, 2018)
- IALA guidelines G1018 (IALA, 2022)/G1138 (IALA, 2017) on risk management and the use of the Simplified IALA Risk Assessment Method (SIRA) respectively.

7.6.2 Impact assessment criteria

7.6.2.1 The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. For the purposes of the shipping and navigation assessment, magnitude is equated to the likelihood of an incident or impact occurring, whilst sensitivity is equated to the consequence of that impact occurring.

7.6.2.2 The criteria for defining magnitude/likelihood in this chapter are outlined in Table 7.13 below.

Table 7.13: Definition of terms relating to the magnitude/likelihood of an impact.

Magnitude of impact	Definition
High	• Frequent hazard occurrence, multiple times during Morgan Generation Assets lifecycle (100%) • Impact continuous throughout Morgan Generation Assets duration (daily).
Medium	• Reasonably probable that hazard may occur once during Morgan Generation Assets lifecycle (50%) • Impact would occur periodically under certain conditions throughout Morgan Generation Assets duration (multiple times per year).
Low	• Unlikely that hazard occurs during Morgan Generation Assets lifecycle but has occurred at other offshore wind farms (10%) • Impact would occur infrequently during uncommon conditions throughout Morgan Generation Assets duration (once per year).
Negligible	• Extremely unlikely that hazard occurs at Morgan Generation Assets and has rarely occurred within industry (1%) • Impact could occur during rare conditions throughout Morgan Generation Assets duration (less than once per year).

7.6.2.1 The criteria for defining sensitivity/consequence in this chapter are outlined in Table 7.14 below.

Table 7.14: Definition of terms relating to the sensitivity/consequence to the receptor.

Sensitivity	Definition
Very High	Major consequence – multiple loss of life, loss of vessel (> £10million), major pollution (Tier 3 as per national contingency plan (MCA, 2017)) and long-term disruption to operators/marine users.
High	Serious consequence – fatality/serious injuries, serious damage to vessel (< £10million), serious pollution (Tier 2 as per MCA, 2017) and prolonged disruption to operators/marine users.
Medium	Moderate consequence – Serious injuries, moderate damage to vessel (< £1million), moderate pollution (Tier 2 as per MCA, 2017) and temporary disruption to operators/marine users.

Sensitivity	Definition
Low	Minor consequence – Multiple minor injuries, minor damage (< £100k) to vessel, minor pollution (Tier 1 as per MCA, 2017) and short-term disruption to operators/marine users.
Negligible	Negligible consequence – Minor injury, minor damage (< £10k), minor spill and minimal disruption to operators/marine users.

7.6.2.2 The significance of the effect upon shipping and navigation is determined by correlating the magnitude/likelihood of the impact and the sensitivity/consequence of the receptor. The particular method employed for this assessment is presented in Table 7.15. Where a range of significance of effect is presented, the final assessment for each effect is based upon expert judgement.

7.6.2.3 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Table 7.15: Matrix used for the assessment of the significance of the effect.

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

7.7 Key parameters for assessment

7.7.1 Maximum Design Scenario

7.7.1.1 The Maximum Design Scenarios (MDSs) identified in Table 7.16 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project description of the Environmental Statement. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design scheme.

Table 7.16: MDS considered for the assessment of potential impacts on shipping and navigation.

[a] C=construction, O=operations and maintenance, D=decommissioning

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	**Construction phase** • Four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2). **Operations and maintenance phase** • Operational life of 35 years • Maximum extent of Morgan Array Area at 280 km^2. **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	Greatest extent of the Morgan Generation Assets over the longest duration, would impact the most routes whilst vessels navigate around the Morgan Array Area and, therefore the greatest potential for impacts on recognised sea lanes essential to international navigation.
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	**Construction phase** • Four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2). **Operations and maintenance phase** • Operational life of 35 years • Maximum extent of Morgan Array Area at 280 km^2. **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	Greatest extent of the Morgan Generation Assets over the longest duration would impact the most routes whilst vessels navigate around the Morgan Array Area and, therefore the greatest potential for impacts on commercial operators and routes.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Impact to adverse weather routeing.	✓	✓	✓	**Construction phase** • Four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2). **Operations and maintenance phase** • Operational life of 35 years • Maximum extent of Morgan Array Area at 280 km^2. **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	Greatest extent of the Morgan Generation Assets over the longest duration would impact the most routes whilst vessels navigate around the Morgan Array Area and, therefore the greatest potential for impacts on adverse weather routing.
Impact on access to ports and harbours.	✓	✓	✓	**Construction phase** • Four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2) • Up to 69 construction vessels on site at any one time (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels) • Up to 1,929 installation vessel movements (return trips) during construction (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels). **Operations and maintenance phase** • Operational life of 35 years • Maximum extent of Morgan Array Area at 280 km^2	Greatest extent of the Morgan Generation Assets over the longest duration would impact the most routes whilst vessels navigate around the Morgan Array Area and, therefore the greatest potential impact on access into ports and harbours.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Up to 16 operations and maintenance vessels on site at any one time (CTVs/workboats, jack-up vessels, cable repair vessels, service operations vessels or similar and excavators/backhoe dredgers) • Up to 719 operations and maintenance vessel movements (return trips) each year (including CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredger). **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	**Construction phase** • Up to four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2) • Maximum number of wind turbines (96) and four OSPs (45 m x 65 m x 75 m) • Wind turbines: maximum rotor diameter of 320 m, upper blade tip height above Lowest Astronomical Tide (LAT) of 364 m • Minimum spacing of 1,400 m between structures • Up to 69 construction vessels on site at any one time (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels) • Up to 1,929 installation vessel movements (return trips) during construction (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels). **Operations and maintenance phase** • Operational life of 35 years • Wind turbine numbers, dimensions, area and supporting infrastructure as described for construction phase	The largest Morgan Array Area with the minimum distance between the largest number of structures has the greatest potential to inhibit SAR response and access. Maximum number of vessels over the longest period has the greatest potential to increase the incident rate requiring more frequent SAR response.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Up to 16 operations and maintenance vessels on site at any one time (CTVs/workboats, jack-up vessels, cable repair vessels, service operations vessels or similar and excavators/backhoe dredgers) • Up to 719 operations and maintenance vessel movements (return trips) each year (including CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredger). **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	
Impact on vessel to vessel collision risk.	✓	✓	✓	**Construction phase** • Four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2) • Up to 69 construction vessels on site at any one time (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels) • Up to 1,929 installation vessel movements (return trips) during construction (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels) • Construction base not yet identified at this stage in the pre-application processes but expected to be in the Irish Sea region. **Operations and maintenance phase** • Operational life of 35 years • Up to 16 operations and maintenance vessels on site at any one time (CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredgers)	Greatest extent of the Morgan Generation Assets over the longest duration, with the maximum number of project vessel movements, therefore the highest potential for increases in the risk of collision.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Up to 719 operations and maintenance vessel movements (return trips) each year (including CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredger) • Maximum extent of Morgan Array Area at 280 km^2. **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	
Impact on allision (contact) risk to vessels.	✓	✓	✓	**Construction phase** • Up to four years construction duration • Construction activities over the maximum extent of the Morgan Array Area (280 km^2) • Maximum number of wind turbines (96) plus four OSPs (45 m x 65 m x 75 m) • Lower blade tip height above LAT of 34 m • Minimum spacing of 1,400 m between wind turbines • Up to 1,929 installation vessel movements (return trips) during construction (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels). **Operations and maintenance phase** • Operational life of 35 years • Wind turbine numbers, dimensions, area and supporting infrastructure as described for construction phase • Up to 719 operations and maintenance vessel movements (return trips) each year (including CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredger). **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years	Greatest extent of the Morgan Generation Assets with the maximum number of structures, the maximum number of project vessel movements, and over the longest duration, therefore the highest potential for increases in the risk of allision/contact.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	**All phases** • Operational life of 35 years • Maximum extent of Morgan Array Area (280 km^2) • Maximum number of wind turbines (96) plus four OSPs (45 m x 65 m x 75 m) • Minimum wind turbine spacing of 1,400 m between wind turbines in a row and 1,400 m between rows of wind turbines.	Greatest extent of the Morgan Generation Assets over the longest period with the most wind turbines and minimum spacing, therefore has the greatest potential to exacerbate the impacts on marine navigation, communications and positioning systems.
Impact on recreational craft passages and safety.	✓	✓	✓	**Construction phase** • Four years construction duration • Maximum number of wind turbines (96) plus four OSP (45 m x 65 m x 75 m) • Lower blade tip height above LAT of 34 m • Minimum spacing of 1,400 m between wind turbines • Construction activities over the maximum extent of the Morgan Array Area (280 km^2) • Up to 1,929 installation vessel movements (return trips) during construction (including main installation/support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels). **Operations and maintenance phase** • Operational life of 35 years • Wind turbine numbers, dimensions, area and supporting infrastructure as described for construction phase • Maximum extent of Morgan Array Area at 280 km^2 • Up to 719 operations and maintenance vessel movements (return trips) each year (including CTVs/workboats, jack-up vessels, cable repair vessels, service operation vessels or similar and excavators/backhoe dredger). **Decommissioning phase**	Greatest extent of the Morgan Generation Assets over the longest period with the most wind turbines, smallest spacing and lowest air draught clearance, therefore, has the greatest potential to impact upon recreational vessel activities and safety.

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓	✓	**Construction phase** • Up to four years construction duration • Inter-array cables: up to 390 km in length, with a minimum burial depth of 0.5 m. Cable protection laid over a maximum of 39 km of the cable with a height of up to 3 m. Up to 10 cable crossings, each cable crossing has a length of up to 80 m and a height of up to 4 m • Interconnector cables: up to three cables with a maximum total length of 60 km and a minimum burial depth of 0.5 m. Cable protection laid over a maximum of 12 km with a height of up to 3 m. Up to 10 cable crossings, each crossing has a length of up to 50 m and a height of up to 3 m. **Operations and maintenance phase** • Operational life of 35 years • Lengths and dimensions of cables, cable protection and cable crossings as described for construction phase. **Decommissioning phase** • The duration of the decommissioning programme is anticipated to be the same as for construction, and thus, up to four years • Lengths and dimensions of cables, cable protection and cable crossings as described for construction phase • During the decommissioning phase the changes would gradually decrease from the operations and maintenance MDS as the need for project-related vessels is reduced and structures are removed and cut below the seabed.	Longest length of cables, minimum cable burial depth and maximum length/quantities of cable protection over the greatest duration of the Morgan Generation Assets, therefore the highest potential for increases in the risk of anchor and/or gear snagging.

7.7.1.2 The MDS when considering the impact on shipping and navigation relates to the maximum extent of the Morgan Array Area, maximum number of wind turbines and OSPs, maximum vessel numbers and maximum vessel movements. The greatest extent and duration of the Morgan Generation Assets would impact the most routes and potential need to deviate around the Morgan Array Area. The maximum number of wind turbines and OSPs with the minimum spacing represents the MDS as this is the greatest number of structures within the Morgan Array Area with the minimum distance between them, that could present a hazard to shipping and navigation. The maximum numbers of vessels present on site and maximum numbers of vessel movements are considered to represent the MDS for the construction, operations and maintenance and decommissioning phases.

7.8 Measures adopted as part of the Morgan Generation Assets

7.8.1.1 For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from Institute of Environmental Management and Assessment (IEMA), 2016):

- Measures included as part of the project design. These include modifications to the location or design of the Morgan Generation Assets which are integrated into the application for consent. These measures are secured through the consent itself through the description of the development and the parameters secured in the DCO and/or marine licence (referred to as primary mitigation in IEMA, 2016)
- Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects and are secured through the DCO requirements and/or the conditions of the marine licence (referred to as tertiary mitigation in IEMA, 2016).

7.8.1.2 A number of measures (primary and tertiary) have been adopted as part of the Morgan Generation Assets to reduce the potential for impacts on shipping and navigation. These are outlined in Table 7.17 below. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Morgan Generation Assets and have therefore been considered in the assessment presented in section 7.9 below (i.e. the determination of magnitude/likelihood and therefore significance assumes implementation of these measures).

7.8.1.3 Where significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA 2016) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in section 7.9 below.

7.8.1.4 Further to the commitments made within the PEIR, additional mitigation was adopted for inclusion in the Environmental Statement, this included amendments to the boundaries of the Morgan Array Area and the commitment to two lines of orientation in the array layout.

Table 7.17: Measures adopted as part of the Morgan Generation Assets.

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
Primary measures: Measures included as part of the project design		
Development of and adherence to a Design Plan (DP) that will be prepared in accordance with the layout principles, which will be agreed with the Marine Management Organisation (MMO), in consultation with the Maritime Coastguard Agency (MCA) and Trinity House	A Design Plan, including a plan of the Morgan Array Area, will be prepared and submitted to the MCA and Trinity House post-consent but before construction commences. Wind turbine layout plan to be agreed with MCA and Trinity House prior to construction and maintain two lines of orientation for navigation and SAR access within the Morgan Array Area. The Applicant has increased the minimum spacing between infrastructure within the array area, increasing the spacing from 1,000 m between rows of wind turbines and 875 m between each wind turbine in a row to proposed minimum spaces of 1,400 m both within and between rows, in order to provide additional space for continued fishing and transit by commercial fishing vessels between and around the Morgan Array Area.	The Design Plan is secured within the deemed marine licences in the draft DCO (Document Reference C1). The minimum spacing between infrastructure and two lines of orientation is secured through a requirement of the draft DCO and within the deemed marine licences within the draft DCO (Document Reference C1).
Development of and adherence to an Aids to Navigation Management Plan (ANMP) to ensure adequate navigational markers (including lighting and a buoyed construction area), in accordance with the most recent relevant industry guidance as advised by Trinity House and MCA and agreed prior to commencement of offshore construction	To ensure navigational safety and minimise risk, suitable AtoN lighting and marking of the Morgan Array Area shall be undertaken complying with IALA Recommendations G1162 (IALA, 2021), to be finalised and approved in consultation with MCA and Trinity House through the preparation of an ANMP. Fog horns to alert vessels to the position of structures when visibility is poor. Wind turbine informal naming/associated markings shall not interfere with formal AtoN's. AIS transponders to be placed on periphery corner wind turbines. To ensure navigational safety and minimise risk, buoys will be deployed around construction work in Morgan Array Area in line with Trinity House requirements and may include a combination of cardinal and/or safe water marks. To be finalised and approved in consultation with MCA and Trinity House prior to construction through an Aids to Navigation Management Plan.	The ANMP is secured within the deemed marine licences within the draft DCO (Document Reference C1).
The Applicant has committed to a minimum lower blade tip height (air draught clearance) of 34 m above LAT	Wind turbine blades will have 34 m clearance above MHWS. This is in line with MCA recommendations of at least 22 m clearance	Secured as a requirement of the draft DCO (Document Reference C1) and through a

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	above MHWS as per MGN654 to reduce risk of allision and contact with structures.	condition in the deemed marine licences within the draft DCO.
Development of and adherence to an Offshore Environmental Management Plan (EMP) that includes a Fisheries Liaison and Co-existence Plan (FLCP)	The use of guard vessels, as required, will be set out in the Fisheries Liaison and Co-existence Plan (FLCP). Where cable exposures exist during the operational and maintenance phase, which could result in significant risk, guard vessels will be used where appropriate until the risk has been mitigated by burial and/or other protection methods, ensuring navigational safety and minimising the potential risk of gear snagging. Guard vessels facilitate engagement with commercial fisheries stakeholders during specific project works, maximising awareness of temporary hazards and reducing potential for interactions between the commercial fishing activity and the Morgan Generation Assets. Provision of detailed project information to fishermen to aid co-existence, such as site location for upload into fish plotters. An outline plan has been submitted as part of the Application (Document Reference J11).	A FLCP as part of an Offshore EMP secured within the deemed marine licences within the draft DCO (Document Reference C1).
Development and adherence to an Offshore Construction Method Statement (CMS) which includes a Cable Specification and Installation Plan (CSIP) and details of cable monitoring to ensure under keel clearance (UKC) is maintained and no more than a 5% reduction in water depth (referenced to Chart Datum) will occur as a result of cable protection at any point over cables without prior written approval from the Licensing Authority	To ensure navigational safety and minimise risk of gear snagging, a CSIP will be prepared (in line with consent conditions) prior to installation of the Morgan Generation Assets. This will include a detailed cable laying plan, including geotechnical data, cable laying techniques, cable protection, monitoring of cables. This will be informed by a Cable Burial Risk Assessment (CBRA), which will include details on minimum target burial depths to be undertaken pre-construction, including consideration of under keel clearance (UKC). All subsea cables will be either fully buried at least 0.5 m (where ground conditions permit and burial tool performance allows), partially buried (buried but not to target depth) with rock protection, or surface laid with cable protection. Selected methods will be based on the risk assessment and the protection will be periodically monitored and maintained as practicable. Information distribution will be aimed to be provided no less than three days for notification of buried cables becoming exposed on	A CSIP as part of the Offshore CMS secured within the deemed marine licences within the draft DCO (Document Reference C1).

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	or above the seabed to regional fisheries contacts and 24 hours for notification of damage to the Morgan Generation Assets. The CSIP will include the technical specification of offshore electrical circuits, and a desk-based assessment of attenuation of electro-magnetic field strengths, shielding and cable burial depth in accordance with industry good practice.	
Tertiary measures: Measures required to meet legislative requirements, or adopted standard industry practice		
Notification of construction, maintenance and decommissioning activities through the use of Notice to Mariners (NtMs)	To ensure that the appropriate authorities and stakeholders are informed of works being carried out in waters adjacent to the Morgan Generation Assets. To include: • UK Hydrographic Office (UKHO) • MCA • Kingfisher • Trinity House • Northern Lighthouse Board • RYA • Local Ports and Harbours • Oil and Gas operators • MMO.	NtMs is secured within the deemed marine licences within the draft DCO (Document Reference C1).
Development and adherence to a Vessel Traffic Management Plan (VTMP), to ensure coordination of passage plans, setting out vessel standards, setting out vessel health and safety requirements	To ensure navigational safety and minimise risk, a VTMP will be prepared to ensure the coordination of Morgan Generation Assets vessels during construction and operations and maintenance by the Morgan Generation Assets Marine Co-ordination Centre. This could include specified crossing points, dissemination practices, restricted visibility protocols and coordination with other cumulative developers. To ensure project vessels to not present unacceptable risks to each other or third parties. Morgan Generation Assets marine traffic coordination plans to be made available to all maritime users. Information and warnings will be distributed via Notices to Mariners and other appropriate media (e.g. Admiralty Charts and fishermen's awareness charts) to enable vessels and operators to navigate around the Morgan Array Area effectively and safely.	A VTMP secured within the deemed marine licences within the draft DCO (Document Reference C1). An outline of this plan has been submitted as part of the Application (Document reference J17).

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	All work vessels operating on behalf of the Morgan Generation Assets will have: • MCA Vessel Coding (e.g. Small Commercial Vessel Code) • Appropriate insurance • Crewed by suitably trained/qualified personnel • AIS (Class A/B) • VHF (Ch16) • Appropriate mooring arrangements As industry standard mitigation, the Applicant will ensure that all project related vessels meet both IMO conventions for safe operation as well as Health, Safety and Environment requirements, where applicable. This shall include the following good practice: • Wind farm associated vessels will comply with International Maritime Regulations • All vessels, regardless of size, will be required to carry AIS equipment on board • All vessels engaged in activities will comply with relevant regulations for their size and class of operation and will be assessed on whether they are 'fit for purpose' for activities they are required to carry out • All marine operations will be governed by operational limits, tidal conditions, weather conditions and vessel traffic information • Walk to work solutions will be utilised where possible. An outline VTMP has been submitted as part of the Application (Document Reference J17).	
Site marking and charting	Site is marked on nautical charts including an appropriate chart note to facilitate safe passage planning around the Morgan Generation Assets.	Secured within the deemed marine licences within the draft DCO (Document Reference C1).
Use of advisory clearance distances (around cable installation vessels) and safety zones (OSP/WTG) during construction and periods of maintenance, as per the Safety Zone Statement	To ensure navigational safety and minimise risk, 500 m safety zones will be implemented around wind turbines and OSPs during their construction.	An application for safety zones will be made under the Energy Act 2004, as set out in the Safety Zone Statement (Document Reference J5).

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	50 m safety zones will also be implemented around each item of infrastructure during the construction phase, where no construction works are taking place on that infrastructure (for example, where a wind turbine generator is incomplete or is in the process of being tested before commissioning). During the maintenance phase, 500 m safety zones will also be implemented around any vessel involved in major maintenance works. Whilst no formal application for a safety zone around cable laying operations is possible under Section 95 of the Energy Act 2004, where possible, it is the Applicant's intention to propose rolling advisory safety zones of up to 500 m around vessels installing inter-array cables and interconnector cables in the interests of the safety of all users of the sea, and to provide clearance of 500 m from laid cables until burial is confirmed in case of interaction with anchors or fishing gear. Application and use of safety zones in accordance with the Safety Zone Statement (Document Reference J5).	
Development and adherence to a VTMP requiring continuous watch by multi-channel Very High Frequency (VHF), including Digital Selective Calling	Continuous watch to monitor vessel activities, reducing the risk of incidents and improving response.	A VTMP secured within the deemed marine licences within the draft DCO (Document Reference C1). An outline of this plan has been submitted as part of the Application (Document reference J17).
Development and adherence to an Emergency Response and Cooperation Plan (ERCoP), which sets out details of periodic exercises to reduce the consequences of incidents	ERCoP, agreed with MCA prior to construction and aligned with MGN654 "Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues" Periodic emergency management and response exercises will be run by developer, in conjunction with SAR, as detailed in the ERCoP.	ERCoP secured within the deemed marine licences within the draft DCO (Document Reference C1).
Development and adherence to an Offshore EMP, which includes a Marine Pollution Contingency Plan (MPCP) to minimise and manage the risk of marine pollution events	Development of an Offshore EMP that details minimum environmental management requirements expected of the Applicant and all contractors and subcontractors, to ensure accidental pollution into the marine environment is minimised, through the development and adherence of a Marine Pollution	A MPCP as part of an Offshore EMP secured within the deemed marine licences within the draft DCO (Document Reference C1).

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	Contingency Plan, for approval prior to commencement of construction. Measures will be adopted to ensure that the potential for release of pollutants from construction, and operations and maintenance, and decommissioning activities is minimised, which will include accidental spills planning, response and notification requirements.	
Incident investigation and reporting	Risk assessments to be reviewed following incidents, and additional risk controls identified if appropriate to reduce the likelihood of recurrence. Lessons learnt will be disseminated to improve safety record of Morgan Generation Assets operations.	Incident reporting requirements and expectations including: • MAIB (Merchant Shipping Act) • Health and Safety Executive (RIDDOR) • Harbour Authority under Port Marine Safety Code.
Hydrographic surveys to reduce the risk of grounding or snagging of cables	MGN654 and its annexes requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager and the UKHO.	Secured within the deemed marine licences within the draft DCO (Document Reference C1).
Development and adherence to an Offshore Construction Method Statement (CMS) and development and adherence to a Construction Programme (CP)	Offshore Construction Method Statement and Construction Programme to be approved by MMO in consultation MCA and Trinity House. Where possible, construction to follow linear progression avoiding disparate construction sites across development area.	An Offshore CMS and CP secured within the deemed marine licences within the draft DCO (Document Reference C1).
Personal Protective Equipment (PPE)	To maintain the safety of those working at the Morgan Generation Assets, all personnel will wear the correct PPE suitable for the location and role at all times, as defined by the relevant Quality, Health, Safety and Environment documentation. This will include the use of Personal Locator Beacons.	Industry best practice.
Inspection and maintenance programme	To ensure the safe operation of the Morgan Generation Assets, regular maintenance regime by developer to check the Morgan Generation Assets infrastructure, its fittings and any signs of wear and tear. This should identify any defects which might cause a failure.	Industry best practice.
Training and site inductions	To maintain the safety of those working at the Morgan Generation Assets, the Applicant is responsible for ensuring that all staff	Industry best practice.

Measures adopted as part of the Morgan Generation Assets	Justification	How the measure will be secured
	engaged on operations are competent to carry out the allocated work and have completed a site induction.	
Compliance with International, UK and Flag State Regulations inc. IMO conventions	To ensure navigational safety, compliance from all vessels associated with the proposed project with international maritime regulations as adopted by the relevant flag state such as Convention on the International Regulations for Preventing Collisions at Sea (IMO, 1972) and Safety of Life at Sea Convention (SOLAS) (IMO, 1974).	Statutory requirement.
Continued engagement of the MNEF, post consent	To ensure that the appropriate authorities and stakeholders are informed of works being carried out in waters adjacent to the Morgan Generation Assets, a regular engagement forum will be maintained.	Secured through the Mitigation and Monitoring Schedule (Document Reference J6).
Development of and adherence to a Navigation Monitoring Strategy setting out vessel traffic monitoring and post construction monitoring to identify unanticipated project impacts	To ensure navigational safety is maintained, continuous AIS monitoring during construction and immediate period post construction will be provided to MCA for approval as set out in the Offshore In-principle Monitoring Plan (Document Reference J12).	Navigation Monitoring Strategy secured within the deemed marine licences within the draft DCO (Document Reference C1).

7.9 Assessment of significant effects

7.9.1 Introduction

7.9.1.1 The impacts of the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets have been assessed on shipping and navigation. The potential impacts arising from the construction, operations/ maintenance and decommissioning phases of the Morgan Generation Assets are listed in Table 7.16, along with the MDS against which each impact has been assessed.

7.9.1.2 A description of the potential effect on shipping and navigation receptors caused by each identified impact is given below.

7.9.2 Impact on recognised sea lanes essential to international navigation

7.9.2.1 The construction, operations/maintenance, and decommissioning of the Morgan Generation Assets may lead to an impact on recognised sea lanes essential to international navigation. This would be in contravention to requirements set out in UNCLOS Article 60 and the NPS EN-3 Paragraph 2.8.326. The MDS is represented by the maximum extent of the generation infrastructure and is summarised in Table 7.16.

7.9.2.2 The TSS Liverpool Bay and TSS Off Skerries are charted IMO routeing measures and provide the only route for large ships into Liverpool so would meet the definitions as sea lanes essential to international navigation.

7.9.2.3 During consultation, several stakeholders stated that historic routes between any two ports are necessarily 'recognised sea lanes' and therefore should not be impacted. A review of UNCLOS Article 22 determines that: '*4. The coastal State shall clearly indicate such sea lanes and traffic separation schemes on charts to which due publicity shall be given*'. Therefore, the onus is on the MCA to put forward a proposed sea lane to IMO who would formally designate it. Given that this has not occurred, and no such routes are indicated on charts, Article 60 and NPS EN-3 2.8.326 would not apply. These principles were set out in the application for the Thanet Extension offshore wind farm and were reaffirmed by the Examining Authority in their Recommendation Report (Thanet Extension, 2019). Therefore, such routes are better defined as strategically important routes or lifeline ferry services as per NPS EN-3 Paragraph 2.8.328 and Paragraph 2.8.329.

Construction phase

Magnitude of impact

7.9.2.4 During construction, vessel traffic would be displaced from the Morgan Array Area due to the presence of construction buoyage and 500 m safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain safe passing distance of at least 1 nm from navigational hazards. Therefore, there is insufficient spacing between wind turbines (1,400 m is equivalent to 0.76 nm) for a commercial vessel to safely navigate through the Morgan Array Area.

7.9.2.5 The Morgan Array Area is located more than 20 nm to the north of the TSS Liverpool Bay and less than 50 commercial vessels per year using the TSS pass through the Morgan Array Area and would be deviated.

7.9.2.6 The magnitude is therefore, considered to be **negligible**.

Sensitivity of the receptor

7.9.2.7 Where vessels require deviation around the Morgan Array Area in order to access the TSSs, there remains sufficient sea room and water depth to enable alternative routeing without significant increases in transit distance.

7.9.2.8 The sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.2.9 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms.

Operations and maintenance phase

7.9.2.10 During the operations and maintenance phase of the Morgan Generation Assets, large commercial ships would not transit through the Morgan Array Area due to the proximity of structures and would be required to route around the Morgan Array Area. The impact on vessel routeing would therefore be similar to the latter stages of construction where vessels are displaced by construction buoyage, safety zones and the presence of structures. Furthermore, during the operations and maintenance phase, mariners will be more familiar with the presence of the Morgan Array Area and able to make more effective routeing decisions. As a result, the impacts to recognised sea lanes essential to international navigation during operations and maintenance are not anticipated to be substantially different to those during construction described above.

7.9.2.11 The magnitude of the impact is therefore deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms.

Decommissioning phase

7.9.2.12 The impacts to recognised sea lanes essential to international navigation during decommissioning are not anticipated to be substantially different to those during construction. During both the construction and the decommissioning phases of the Morgan Generation Assets, large commercial ships will not be able to transit through the Morgan Array Area, whether through the presence of construction/ decommissioning buoyage or structures and therefore the impact on vessel routeing will be the same. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.2.13 Therefore, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms.

7.9.3 Impact to commercial operators including strategic routes and lifeline ferries

7.9.3.1 The construction, operations/maintenance, and decommissioning of the Morgan Generation Assets may lead to impacts to commercial operators including strategic routes and lifeline ferries as defined in NPS EN-3 Paragraph 2.8.328, which includes all Irish Sea ferry operators. The MDS is represented by the maximum extent of the generation infrastructure and is summarised in Table 7.16.

7.9.3.2 This impact is limited to routeing in typical weather conditions, section 7.9.4 assesses the impacts on vessel routeing in adverse weather situations.

Construction phase

Magnitude of impact

7.9.3.3 During construction, vessel traffic would be displaced from the Morgan Array Area due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain safe passing distance of at least 1 nm from navigational hazards. It is anticipated vessels would deviate around the construction site.

7.9.3.4 The analysis of vessel routes in section 7.5 shows that several ferry and cargo/tanker shipping routes would necessitate deviation around the Morgan Array Area (see Table 7.18 and Table 7.19, and Figure 7.6 and Figure 7.7 respectively). The revised passage plans were developed by the NASH project team, including master mariners, and account for existing decision-making principles (such as passing at least 1.5 nm from a wind turbine) that were obtained during consultation with operators and the navigation simulation sessions (see Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement).

7.9.3.5 The Liverpool to Dublin route previously operated by P&O ceased operation in December 2023 due to the loss of the operator's berth.

7.9.3.6 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Notification of construction, maintenance and decommissioning activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the construction area
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Vessel Traffic Management Plan to manage vessel safety and reduce impacts in accordance with the Outline Vessel Traffic Management Plan (Document Reference J17).

Table 7.18: Impact on ferry routeing.

Parameter	IoMSPC HEY-DOUG	IoMSPC LIV-DOUG	Stena LIV-BEL-E	Seatruck HEY-WAR
Example Vessels (2019 to 2022)	Ben-my-Chree	Manannan	Stena Edda, Stena Embla, Stena Mersey, Stena Horizon, Stena Lagan, Stena Forecaster, Stena Forerunner	Seatruck Precision, Seatruck Performance
Approximate Annual Crossings (2022)	1,451	593	390	1,099
Baseline Distance (nm)	46.8	56.9	113.9 E of Calder 114.9 W of Calder	100.2
Baseline Time (Minutes)	225	165	480	480
Service Speed (Knots)	17.2	28.8	18.7	15.4
Deviated Distance	47.3	57.1	114.6 E of Calder 117.4 W of Calder	100.8
Additional Morgan Generation Assets Time (Minutes)	+1.6	+0.4	+2.3 E of Calder +7.9 W of Calder	+2.0

Table 7.19: Increase in distance for impacted cargo/tanker routes.

Route	Approximate Annual Crossings (2022)	Baseline Distance (nm)	Deviated Distance (nm)	Additional Deviated Distance (nm)	Total Additional Distance/Year
Liverpool to E IoM – West	10	77.7	81.0	+3.3	+32.6
Liverpool to E IoM – Central	54	72.4		+8.6	+464.1
Liverpool to E IoM – East	14	70.1	71.8	+1.7	+23.5
Douglas to Heysham	6	50.0	50.8	+0.8	+4.5
Off Skerries TSS to Solway Firth	42	72.7	73.6	+0.9	+39.0
Douglas to Liverpool Bay TSS	8	61.0	61.0	0.0	+0.1
Douglas to Liverpool	6	58.3	58.4	+0.1	+0.8

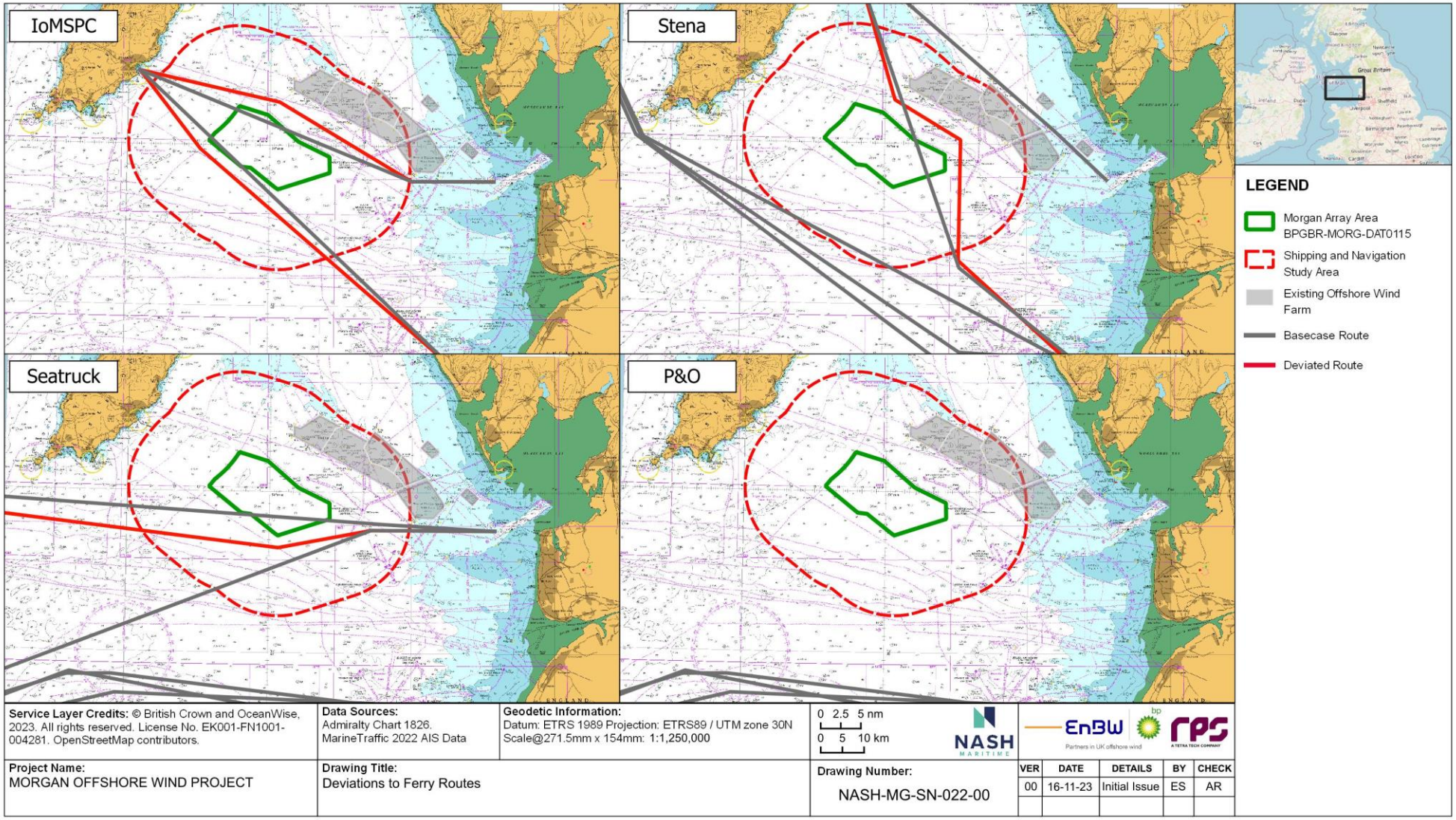


Figure 7.6: Deviations to ferry routes.

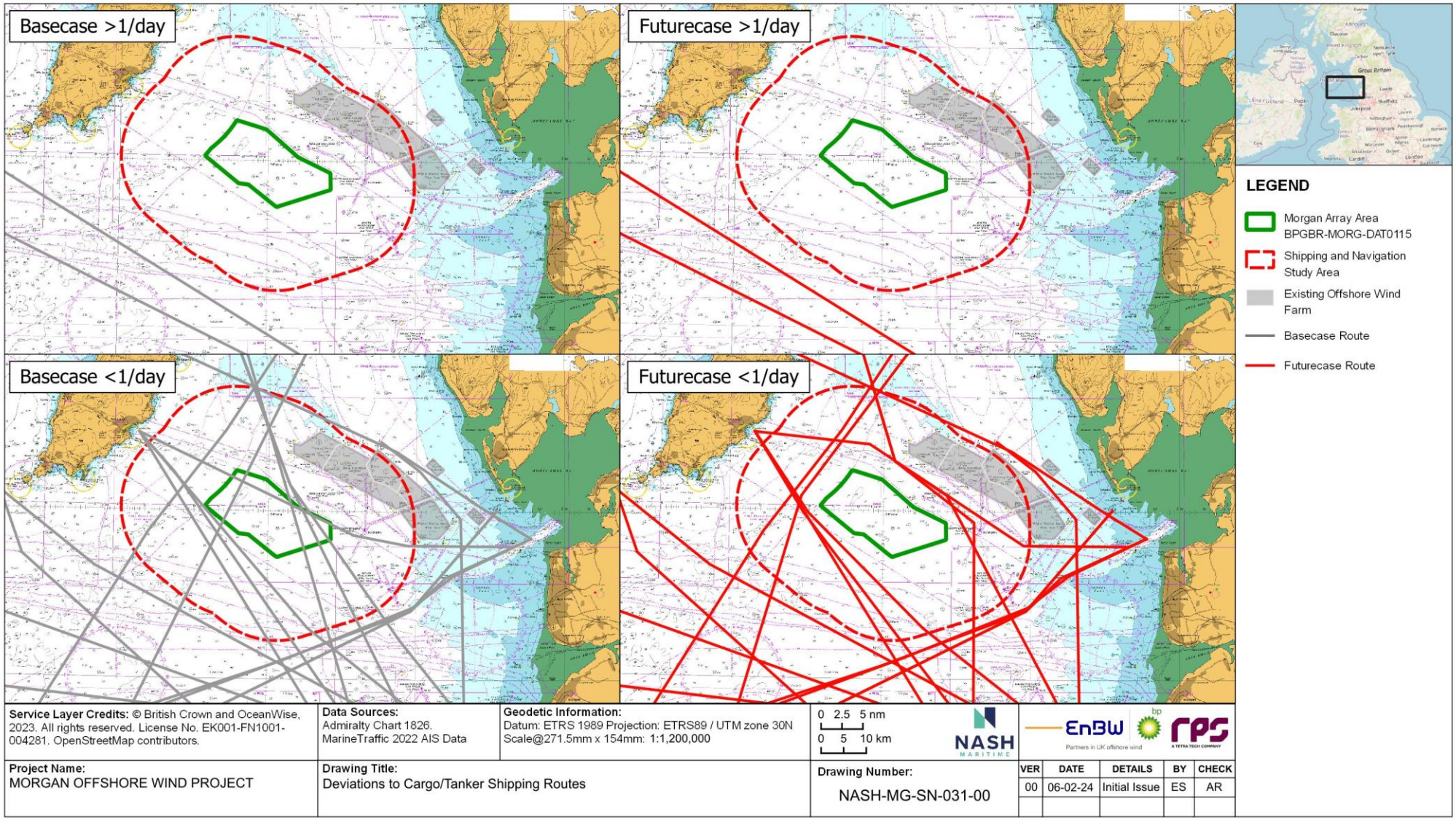


Figure 7.7: Deviations to commercial shipping routes.

Isle of Man Steam Packet Company

7.9.3.7 The IoMSPC route between Heysham and Douglas with approximately 1,500 movements per year passes across the northeast boundary of the Morgan Array Area. A revised passage plan was developed with vessels departing Heysham, transiting west, passing approximately 1.2 nm south of the West of Duddon Sands Offshore Wind Farm, before turning northwesterly, passing east of the North Morecambe Gas Field, between the Morgan Array Area and Walney Offshore Wind Farms, and then turning northwest towards Douglas once clear of the northern part of the Morgan Array Area. This would require a deviation of 0.5 nm/1.6 minutes of steaming time per crossing.

7.9.3.8 The IoMSPC route between Douglas and Liverpool with approximately 600 movements per year passes across the southwest boundary of the Morgan Array Area. A revised passage plan was developed following the existing route but increases the passing distance to 1.5 nm to the west of the Morgan Array Area. This would require a deviation of 0.3 nm/0.4 minutes of steaming time per crossing.

7.9.3.9 As daily services of IoMSPC would be impacted, the magnitude is therefore, considered to be **high**.

Stena Line

7.9.3.10 Stena Line operate a route between Liverpool and Belfast which has numerous options for departing Liverpool and passing either side of the Isle of Man.

7.9.3.11 The routes that pass to the east of the Isle of Man intersects the Morgan Array Area. The existing passage plans for the east of Isle of Man route show two routes, namely to the west and east of the Calder Gas Field, which between them account for 390 movements per year. The route to the west would require vessels to turn more northerly once clearing the Calder Gas Field, maintaining safe distance to the Morgan Array Area, before transiting between the Morgan Array Area and Walney Offshore Wind Farms. The route to the east of Calder Gas Field is largely taken by northbound vessels, having left the approaches to Liverpool early to take a shorter route through the oil and gas fields. This route would require deviation towards the North Morecambe Gas Field before also transiting through the centre of the route between the Morgan Array Area and Walney Offshore Wind Farms, and then turning north to northwest toward the Isle of Man.

7.9.3.12 Given this passage plan, passing east of Calder Gas Field, vessels on the Stena route between Liverpool and Belfast to the east of the Isle of Man would necessarily transit a further 0.7 nm, and therefore an additional 2.3 minutes. If a reroute west of the Calder Gas Field and then east of the Morgan Array Area was selected, this would necessitate an additional 2.5 nm equating an additional 7.9 minutes added to the journey time.

7.9.3.13 Other Stena Line routes between Heysham and Belfast, Liverpool to Belfast (west of the Isle of Man) and between Liverpool and Dublin run clear of the Morgan Array Area.

7.9.3.14 As services of Stena Line ferries would be impacted, the magnitude is considered to be **medium**.

Seatruck Ferries

7.9.3.15 The Seatruck route between Heysham and Warrenpoint with approximately 1,000 movements per year would necessitate a minor deviation to pass to the south of the Morgan Array Area. Vessels would depart Heysham as they currently do, passing

north of the South Morecambe Gas Field before making a small alteration of course southwest to pass clear of the Morgan Array Area, before turning northwest towards Carlingford Lough. Given this passage plan, vessels on the Seatruck route between Heysham and Dublin which would necessarily transit an additional 0.5 nm and require an additional 2 minutes of transit time.

7.9.3.16 Other Seatruck routes between Heysham and Dublin, and Liverpool and Dublin run clear of the Morgan Array Area.

7.9.3.17 As daily services of Seatruck Ferries would be impacted, the magnitude is considered to be **high**.

Commercial cargo/tanker operators

7.9.3.18 None of the major cargo/tanker routes with more than one movement per day would be directly impacted by the Morgan Array Area.

7.9.3.19 Seven routes were identified which would be deviated around the Morgan Array Area, including routes into Douglas, Heysham and Barrow. The majority of these minor routes have less than one vessel transit per week.

7.9.3.20 A regular freight service between Ramsey and Glasson passes through the Morgan Array Area on occasion and would require deviation.

7.9.3.21 As regular commercial services would be impacted, the magnitude is considered to be **medium.**

Sensitivity of the receptor

Isle of Man Steam Packet Company

7.9.3.22 The IoMSPC route between Heysham and Douglas with approximately 1,500 movements per year passes across the northeast boundary of the Morgan Array Area. To pass clear to the northeast this would necessitate an additional 1.6 minutes of steaming time per crossing. On a three hour and 45 minute service, with greater existing variation in transit duration and turn around time, the deviation is not anticipated to impose significant operational impacts but may increase pressure on operators.

7.9.3.23 The IoMSPC route between Douglas and Liverpool, with approximately 600 movements per year, passes across the northwest boundary of the Morgan Array Area. To pass to the west, this would necessitate an additional 0.4 minutes of steaming time per crossing. On a two hour 45 minute service, with greater existing operational variation in transit duration and turn around time, the deviation is not anticipated to impose significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints.

7.9.3.24 The sensitivity of this receptor is therefore, considered to be **low**.

Stena Line

7.9.3.25 The Stena route between Liverpool and Belfast to the east of the Isle of Man, with approximately 390 movements per year, directly intersects the Morgan Array Area. To pass to the east this would necessitate between 2.3 and 7.9 minutes of additional steaming time per crossing, dependent upon which route had been taken passed the Calder Gas Field. On an eight hour service, with greater existing operational variation in transit duration and turn around time, the deviation is not anticipated to impose

significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints.

7.9.3.26 Other Stena Line routes between Heysham and Belfast, Liverpool to Belfast (west of the Isle of Man) and between Liverpool and Dublin are clear of the Morgan Array Area.

7.9.3.27 The sensitivity of this receptor is considered to be **low**.

Seatruck Ferries

7.9.3.28 The Seatruck route between Heysham and Warrenpoint, with approximately 1,100 movements per year, passes through the southern boundary of the Morgan Array Area. To pass clear to the south, this would necessitate an additional 2 minutes of steaming time per trip. On an eight hour service, with greater existing operational variation in transit duration and turn around time, the deviation is not anticipated to impose significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints.

7.9.3.29 Other Seatruck routes between Heysham and Dublin, and Liverpool and Dublin are clear of the Morgan Array Area.

7.9.3.30 The sensitivity of this receptor is considered to be **low**.

Commercial cargo/tanker operators

7.9.3.31 For cargo/tanker routes, only routes with less than one transit per day would be impacted and are widely dispersed within the shipping and navigation study area. Whilst impacts to these routes may be of greater magnitude, they have far fewer vessel transits. Of the routes which have the greatest deviations, which are between Liverpool and ports or passages to the east of the Isle of Man, this distance is negligible on a long international voyage and is not anticipated to make such routes unviable. Table 7.19 shows some routes with minor reductions in distance, caused by the Morgan Array Area making less direct routes, routinely used to avoid traffic or weather, no longer possible, requiring them to take more direct routes.

7.9.3.32 Given the relatively minor increase in journey times of much less than an hour for the majority of routes, it is considered unlikely that deviated vessels would be any more at risk of missing a tide than they already are, and this could be mitigated through passage planning. Therefore, this is not anticipated to have any significant impacts upon the viability of these routes and the sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.3.33 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.20.

Table 7.20: Magnitude, sensitivity and impact significance relating to impact to commercial operators including strategic routes and lifeline ferries during construction of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	Medium	Low	Minor which is not significant in EIA terms.

Operator	Magnitude	Sensitivity	Significance
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	Medium	Low	Minor which is not significant in EIA terms.

Operations and maintenance phase

7.9.3.34 During the operations and maintenance phase of the Morgan Generation Assets, large commercial ships would not transit through the Morgan Array Area due to the proximity of structures and would be required to route around the Morgan Array Area. The impact on vessel routeing would therefore be similar to the latter stages of construction where vessels are displaced by construction buoyage, safety zones and the presence of structures. The operations and maintenance phase would be longer than other phases at up to 35 years compared to up to four years for the construction phase. As a result, the impacts to commercial operators including strategic routes and lifeline ferries during operations and maintenance are not anticipated to be substantially different to those during construction.

7.9.3.35 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.21.

Table 7.21: Magnitude, sensitivity and impact significance relating to impact to commercial operators including strategic routes and lifeline ferries during operations and maintenance of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	Medium	Low	Minor which is not significant in EIA terms.
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	Medium	Low	Minor which is not significant in EIA terms.

Decommissioning phase

7.9.3.36 The impacts to commercial operators including strategic routes and lifeline ferries during decommissioning are not anticipated to be substantially different to those during construction. During both the construction and the decommissioning phases of the Morgan Generation Assets, large commercial ships will not be able to transit through the Morgan Array Area, whether through the presence of decommissioning buoyage or structures and therefore the impact on vessel routeing will be the same. However,

it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.3.37 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.22.

Table 7.22: Magnitude, sensitivity and impact significance relating to impact to commercial operators including strategic routes and lifeline ferries during decommissioning of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	Medium	Low	Minor which is not significant in EIA terms.
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	Medium	Low	Minor which is not significant in EIA terms.

7.9.4 Impact on adverse weather routeing

7.9.4.1 The construction, operations and maintenance, and decommissioning of the Morgan Generation Assets may lead to impacts to adverse weather routeing including to strategic routes and lifeline ferries as defined in NPS EN-3 Paragraph 2.8.328. During significant wind and wave conditions, it can be hazardous for ferries to navigate beam on to the prevailing conditions, which can cause excessive roll that may result in cargo shift or injuries to passengers. The MDS is represented by the maximum extent of the generation infrastructure and is summarised in Table 7.16.

7.9.4.2 Where significant adverse weather is encountered, standard operating practices would be for the master to advise passengers to remain seated and for vessels to take less direct routes to take advantage of lees from land masses, avoid dangerous sea states or minimise the motions onboard. The navigation simulations (see Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) demonstrated that without being able to adequately weather route, excessive roll would be experienced that reduced control and would be both uncomfortable or dangerous to passengers and cargo.

7.9.4.3 This impact within the shipping and navigation chapter of the Environmental Statement has been limited to the impact on the ferry routes. Ferry services in the shipping and navigation study area are important for facilitating trade, tourism and other important functions. In particular, consultees emphasised that services between the Isle of Man and the UK are lifeline services which carry food, medical supplies and goods which are crucial in a just-in-time economy. The socio-economics approach for considering potential impacts of the Morgan Generation Assets on the Isle of Man is set out within Volume 2, Chapter 13: Socio-economics chapter of the Environmental Statement.

Construction phase

Magnitude of impact

7.9.4.4 During construction, vessel traffic would be displaced from the Morgan Array Area due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain safe passing distance of at least 1 nm from navigational hazards, likely greater in adverse weather.

7.9.4.5 During severe adverse weather where it would be unsafe for a ferry to proceed to sea, some sailings are delayed or inevitably cancelled irrespective of the presence of the Morgan Array Area. However, with the presence of the Morgan Array Area, sailings may be required to route a greater distance and duration than they otherwise would. Over the course of a day, the accumulation of these delays could result in the potential for additional sailings to be cancelled where constraints such as hours of rest are exceeded. Such effects are already experienced by operators, but the presence of the Morgan Generation Assets may exacerbate this.

7.9.4.6 During consultation and navigational simulations, the conditions in which adverse weather routes would be taken, or services cancelled, were shown to be dependent on many different factors including route, vessel, wind/wave directions, wind speed and wave height. Figure 7.8 shows that several adverse weather routes either intersect or pass immediately adjacent to the Morgan Array Area.

7.9.4.7 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the construction area
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Vessel Traffic Management Plan to manage vessel safety and reduce impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

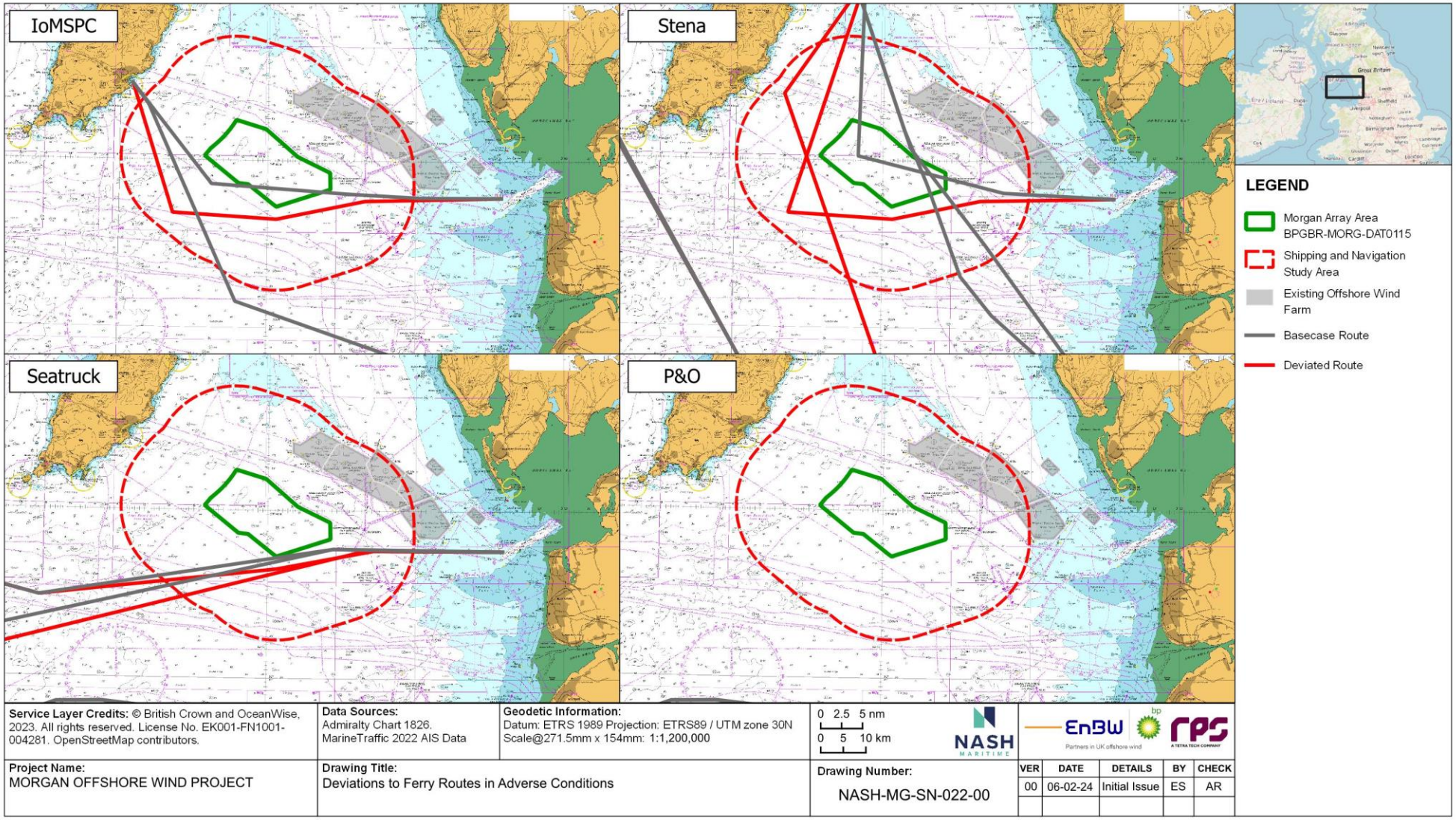


Figure 7.8: Deviations to ferry routes in adverse conditions.

Isle of Man Steam Packet Company

7.9.4.8 The IoMSPC Heysham to Douglas route has been operated by the Ben-My-Chree and more recently the Manxman. These vessels are constrained in heavy seas on the beam, which can cause large roll motions. During the navigation simulations, it was determined that the IoMSPC service between Heysham to Douglas route (Ben-My-Chree) would be impacted at a significant wave height (Hs) of between 2.5 m and 3.0 m. This could cause roll which exceeds 10 degrees and occasionally 30 degree motions which was considered unsafe for passengers and cargo. This equates to greater than a Force 6 occurring at least monthly in summer and fortnightly in winter. Based on a review of AIS data for 2022, it was estimated that the Ben-My-Chree makes significant adverse weather routeing on at least 20 occasions per year of a total of 1,300 crossings.

7.9.4.9 It was noted that masters may be more precautionary in weather routeing and less likely to choose to route east of the Morgan Array Area as they would have reduced optionality should conditions deteriorate and they need to turn towards the southwest to minimise the motion of the vessel. The presence of the Morgan Array Area could increase the number of occasions during which adverse weather routes are taken.

7.9.4.10 The adverse weather routes for the Liverpool to Douglas route run clear of the Morgan Array Area.

7.9.4.11 Give that the adverse weather routeing of a ferry service is anticipated to be impacted infrequently, but multiple times per year, the magnitude is considered to be **medium**.

Stena Line

7.9.4.12 During the navigation simulations, it was determined that the Stena Line ferries route between Liverpool and Belfast would be impacted at 3.0 m Hs. This equates to greater than a Force 7 occurring at least monthly in winter. Based on a review of AIS data for 2022, it was estimated that Stena ferries make significant adverse weather routeing on at least 20 occasions per year of a total of 1,500 crossings.

7.9.4.13 The Stena Line ferries route between Heysham and Belfast would be impacted at 3.0 m Hs. This equates to greater than a Force 7 occurring at least monthly in winter. Based on a review of AIS data for 2022, it was estimated that Stena ferries make significant adverse weather routeing on at least 50 occasions per year of a total of 1,100 crossings.

7.9.4.14 It was noted that masters may be more precautionary in weather routeing and less likely to choose to route east of the Morgan Array Area as they would have reduced optionality should conditions deteriorate and they need to turn towards the southwest to minimise the motion of the vessel. Therefore, the presence of the Morgan Array Area could increase the number of occasions during which adverse weather routes are taken.

7.9.4.15 Other adverse weather routes on other Stena Line services are clear of the Morgan Array Area.

7.9.4.16 Given that the adverse weather routeing of a ferry service is anticipated to be impacted infrequently, but multiple times per year, the magnitude is considered to be **medium**.

Seatruck Ferries

7.9.4.17 The median adverse weather routes used by Seatruck are similar to those used in typical conditions, passing clear to the south of the Morgan Array Area. On rare

occasions, Seatruck take alternative routes which might not be available with the Morgan Array Area.

7.9.4.18 Given that the majority of adverse weather routeing of this ferry service is clear of the Morgan Array Area, the magnitude is considered to be **low**.

Commercial cargo/tanker operators

7.9.4.19 Analysis of cargo/tanker vessel traffic in adverse weather events did not identify any appreciable changes in vessel routes. During MetOffice named storm events, with gale/storm force winds, there was a greater use of the anchorage to the east of Anglesey as vessels seek shelter from the prevailing southwesterlies.

7.9.4.20 The magnitude of the receptor is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.4.21 Figure 7.8 shows anticipated adverse weather routeing with and without the Morgan Generation Assets in situ. The 2022 AIS data has been used to estimate the impact on vessel routes in adverse weather and are summarised in Table 7.23. Each revised passage plan was developed by the NASH project team, including master mariners. These passage plans are based on existing passage plans provided by operators during consultation (such as passing at least 1.5 nm from a wind turbine) and informed by the results of the navigation simulation sessions (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement).

7.9.4.22 During the most severe weather, some services may be cancelled. The Morgan Array Area would not have any effect on these services. However, on some occasions the existing delays due to deviations in adverse weather may result in sailings to be cancelled where hours of rest or schedule constraints are exceeded.

Table 7.23: Impact on ferry routeing in adverse weather.

Parameter	IoMSPC HEY-DOUG	Stena LIV-BEL-E	Stena HEY-BEL
Principal Vessels (2019-2022)	Ben-my-Chree	Stena Edda, Stena Embla, Stena Mersey, Stena Horizon, Stena Lagan, Stena Forecaster, Stena Forerunner	Stena Hibernia, Stena Scotia
Approximate Annual Crossings with Significant Deviation (2022)	20 of 1,300	10 of 1,500	24 (2019) to 52 (2022) of 1,100
Baseline Distance (nm)	50.1	114.0 (W of Calder) 114.5 (E of Calder)	106.9
Total Delay Base Case (Minutes)	+10 to +23	Neg.	+40 to +70
Total Distance due to Morgan Array Area (nm)	55.8	134.4	123.2
Minimum Additional Time due to Morgan Array Area (Minutes)	+21.5	+68.2	+61.1
Minimum Total Delay with Morgan Array Area (Minutes)	+31.5 to +44.5	+68.2	+101.1 to +131.1

Isle of Man Steam Packet Company

7.9.4.23 The IoMSPC Heysham to Douglas adverse weather routeing accounts for an additional 10 to 23 minutes of additional journey time per crossing on a two hour 45 minute journey, as identified within the 2022 AIS data. These transits tend to trend to the southwest and therefore it has been assumed that vessels would pass to the south and west of the Morgan Array Area. A revised passage plan was developed for the Heysham to Douglas route which passes south of the Morgan Array Area, continuing to the west before turning north up to Douglas on a more stable course. This would necessitate an additional 5.7 nm of steaming and a further 21.5 minutes of transit time. This would be in addition to existing delays of approximately between 10 and 23 minutes to total delay of at least 31.5 minutes per crossing on an advertised journey of two hours and 45 minutes.

7.9.4.24 A total delay of more than 31.5 minutes per crossing could accumulate through a day resulting in service cancellations as the schedule would no longer be achievable.

7.9.4.25 Constraints on manning levels have historically been a greater operational consideration for the IoMSPC than other operators. The Maritime Labour Convention sets out requirements for minimum hours of rest and existing schedules and crew rosters are designed around these requirements. Therefore, an accumulation of delays could result in cancellations where there is insufficient hours of rest for the bridge team for return sailings. The introduction of the Manxman in 2023 may lead to greater contingency for the IoMSPC as crew manning arrangements may change to live aboard rather than ashore.

7.9.4.26 Due to the complexity of IoMSPC schedules and the interrelationship between metocean conditions and operational impacts the effects of this would vary each day, but it is credible that services could be cancelled more frequently.

7.9.4.27 On the basis that some services of a ferry could be more frequently cancelled due to the Morgan Array Area, the sensitivity of the receptor is considered to be **medium**.

Stena Line

7.9.4.28 The Stena Line ferries are large vessels with good seakeeping abilities but can be susceptible to excessive roll motions with seas in excess of 3 m Hs on the beam (occurring approximately monthly on average during winter months), posing a risk to passengers and crew. The Stena Line Liverpool to Belfast route has multiple adverse weather options, predominately departing Liverpool to the west using the lee of the Welsh coast and Anglesey before turning north towards Belfast. An alternative route is to the east of the Isle of Man which intersects the Morgan Array Area. Analysis of historical AIS data showed a negligible deviation in these routes from their typical path in adverse weather and a negligible change in journey durations. In adverse weather, it was assumed that masters would choose to pass west of the Morgan Array Area should they prefer to pass east of the Isle of Man.

7.9.4.29 A revised passage plan was developed for the Liverpool to Belfast route which passes west of the Morgan Array Area, and continues towards the Isle of Man to take advantage of any lee in the conditions, before turning northwest to pass east of the Isle of Man. This would necessitate an additional 19.9 nm of steaming (within the Irish Sea) and a further 68 minutes of transit time. Given that this route is more than 15 nm longer than their alternative adverse weather route to the west of the Isle of Man, it is considered unlikely that masters would routinely choose it.

7.9.4.30 The Stena Line Heysham to Belfast routes are similarly constrained in seas on the beam in seas with significant wave heights of between 3.0 and 3.5 m. Their existing

passages takes them between the West of Duddon Sands and Barrow offshore wind farms which is constrained in its width at approximately two nautical miles. Therefore, to offer greater sea room and optionality they routinely pass to the west of West of Duddon Sands and Walney offshore wind farms before continuing to the east of the Isle of Man. This route necessitates an additional 40 to 70 minutes of transit time. With the Morgan Array Area in situ, such a route would now be constrained by the presence of the Morgan Array Area and therefore during the navigation simulations it was concluded that masters may choose to pass south and west of the Morgan Array Area. This is estimated to occur a further increase in transit times of 61 minutes, to a total delay of 101 to 131 minutes on the typical route. Alternatively, masters may choose to continue west and pass west of the Isle of Man which would be a shorter but more exposed route.

7.9.4.31 Whilst a greater transit duration due to the presence of the Morgan Array Area may be required, it is recognised that the increase in transit time compared to the total journey length is low and that there are viable alternative routes. The sensitivity of the receptor is therefore, considered to be **medium**.

Seatruck Ferries

7.9.4.32 The median adverse weather routes used by Seatruck pass immediately adjacent to the south of the Morgan Array Area and therefore have only minor deviations within the revised passage plans to increase the passing distance from the windfarm to at least 1.5 nm. This is anticipated to have a minor impact on journey times. The sensitivity is considered to be **low**.

Commercial cargo/tanker operators

7.9.4.33 As there is little evidence of major adverse weather routeing near to the Morgan Array Area, the sensitivity is considered to be **negligible**.

Significance of the effect

7.9.4.34 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.24.

Table 7.24: Magnitude, sensitivity and impact significance relating to impact to adverse weather routeing during construction of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms.
Stena Line	Medium	Medium	Moderate which is significant in EIA terms.
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.
Commercial cargo/tanker	Low	Negligible	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.

7.9.4.35 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains.

7.9.4.36 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.

Operations and maintenance phase

7.9.4.37 During the operations and maintenance phase of the Morgan Generation Assets, large commercial ships would not transit through the Morgan Array Area due to the proximity of structures and would be required to route around the Morgan Array Area. The impact on vessel routeing would therefore be similar to the latter stages of construction where vessels are displaced by construction buoyage, safety zones and the presence of structures. The operations and maintenance phase would be longer than other phases at up to 35 years compared to up to four years for the construction phase. As a result, the impacts to adverse weather routeing during operations and maintenance are not anticipated to be substantially different to those during construction.

7.9.4.38 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.25. Appropriate further mitigation listed for the construction phase will apply to the operations and maintenance phase of the Morgan Generation Assets.

Table 7.25: Magnitude, sensitivity and impact significance relating to impact to adverse weather routeing during operations and maintenance of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms.
Stena Line	Medium	Medium	Moderate which is significant in EIA terms.
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.
Commercial cargo/tanker	Low	Negligible	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.

7.9.4.39 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains.

7.9.4.40 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.

Decommissioning phase

7.9.4.41 The impacts to adverse weather routeing during decommissioning are not anticipated to be substantially different to those during construction. During both the construction and the decommissioning phases of the Morgan Generation Assets, large commercial ships will not be able to transit through the Morgan Array Area, whether through the presence of decommissioning buoyage or structures and therefore the impact on vessel routeing will be the same. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.4.42 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table 7.25. Appropriate further mitigation listed for the construction phase will apply to the decommissioning phase of the Morgan Generation Assets.

Table 7.26: Magnitude, sensitivity and impact significance relating to impact to adverse weather routeing during decommissioning of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms.
Stena Line	Medium	Medium	Moderate which is significant in EIA terms.
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.
Commercial cargo/tanker	Low	Negligible	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the Morgan Array Area disrupts the preferred adverse weather route.

7.9.4.43 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains.

7.9.4.44 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.

7.9.5 Impact on access to ports and harbours

7.9.5.1 The construction, operations/maintenance and decommissioning phases of the Morgan Generation Assets could lead to reduced access to ports and harbours. These include the key ports of Liverpool, Heysham and Douglas, and small harbours along the English, Welsh and Isle of Man coast.

7.9.5.2 The MDS is represented by the maximum extent of the generation infrastructure and the longest duration of construction and is summarised in Table 7.16.

7.9.5.3 Following determination of the construction base for the Morgan Generation Assets, this impact should be reviewed to ensure that appropriate risk controls are in place.

Construction phase

Magnitude of impact

7.9.5.4 The location of the Morgan Array Area is more than 10 nm from the Statutory or Competent Harbour Authority Areas of any port or harbour in the Irish Sea.

7.9.5.5 The Morgan Array Area would result in deviation of both ferry and other commercial shipping routes, particularly to Liverpool, Douglas and Heysham. These impacts are assessed in section 7.9.2, 7.9.3 and 7.9.4.

7.9.5.6 During construction, there could be up to 1,929 vessel movements per year. These additional movements could lead to congestion or operational challenges in ports and harbours through which they transit. The construction base or bases for the Morgan Generation Assets is not yet determined, but previous offshore wind projects elsewhere in the UK have successfully mitigated these operational challenges, particularly through marine coordination of construction activities and liaison with ports and harbours.

7.9.5.7 The magnitude is considered to be **low**.

Sensitivity of the receptor

7.9.5.8 Given the impacts to ports and harbours during construction are assumed to be manageable, the sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.5.9 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Morgan Generation Assets is not anticipated to adversely impact port/harbour operations.

Operations and maintenance phase

Magnitude of impact

7.9.5.10 During operations and maintenance, there could be up to 719 vessel movements per year associated with the Morgan Generation Assets. These additional movements could lead to congestion or operational challenges in ports and harbours through which they transit. The operations and maintenance base or bases for the Morgan Generation Assets are not yet determined, but previous offshore wind projects elsewhere in the UK have successfully mitigated these operational challenges, particularly through marine coordination of operations and maintenance activities and liaison with ports and harbours.

7.9.5.11 The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.5.12 Given the impacts to ports and harbours during operations and maintenance are assumed to be manageable, the sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

7.9.5.13 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms. A negligible rather than minor effect

has been determined given that the Morgan Generation Assets is not anticipated to adversely impact port/harbour operations.

Decommissioning phase

7.9.5.14 The impacts to reduced access to ports and harbours during decommissioning are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.5.15 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Morgan Generation Assets is not anticipated to adversely impact port/harbour operations.

7.9.6 Impact on emergency response capability due to increased incident rates and reduced access for SAR responders

7.9.6.1 The construction, operations/maintenance and decommissioning phases of the Morgan Generation Assets may lead to an impact on emergency response capability due to increased incident rates and reduced access for SAR responders. The MDS is represented by the greatest extent of the Morgan Generation Assets, the maximum duration, the greatest number of vessel movements and the minimum spacing between structures and is summarised in Table 7.16.

Construction phase

Magnitude of impact

7.9.6.2 Historical incident data presented in section 7.5 shows relatively few incidents have occurred within the sea area identified for the Morgan Array Area. As demonstrated within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement, the construction activities of offshore wind farms can lead to an increase in incidents involving construction vessels, but these are both of low frequency and consequence.

7.9.6.3 It should be noted that often incidents within or adjacent to offshore wind farms are responded to by CTVs before conventional SAR assets (such as helicopters or lifeboats) are able to reach the casualty, providing a beneficial effect. The nearest SAR helicopter base at HMCG Caernafron would have an estimated response time of 45 minutes and the nearest lifeboat station at Douglas could take between 80 and 90 minutes to be on scene.

7.9.6.4 In the event of an incident, SAR assets are required to access the site or surrounding area without risk to themselves. In particular, wind turbines can pose a hazard to SAR helicopters. The design of the Morgan Generation Assets will be such to enable helicopter access and therefore safeguard HMCG obligations to SAR within the UK SAR Region. Several trials have been conducted by HMCG and MCA in SAR at offshore wind farms (see MCA, 2005; 2019) to establish best practice.

7.9.6.5 Emergencies on board, particularly fire or a man overboard, require immediate action by the bridge teams. For example, during fire, it may be necessary to turn the vessel into the wind such that the smoke does not blow across the passenger decks. Consultation has identified that these incidents do infrequently occur on board ferries in the east Irish Sea (in the order of less than once a year).

7.9.6.6 Whilst the Morgan Generation Assets does not necessarily impact upon the likelihood that fire may occur, its presence could constrict the sea room to perform these manoeuvres and may increase the resulting consequences.

- For medical evacuations, during the navigation simulations with the ferry companies, it was concluded that the likely response time of a SAR asset exceeds the transit time in proximity to the Morgan Array Area and that the master would likely make for the nearest port. Therefore, the effect of the Morgan Generation Assets is negligible
- For fires or other serious incidents, during the navigation simulations it was shown that there was sufficient sea room to manoeuvre the vessel to avoid the effects of smoke across the passenger decks and minimise roll motion to aid the onboard response. Furthermore, it was noted that the probability of the incident occurring whilst transiting close to the Morgan Array Area and the conditions being such that the presence of the turbines effected the necessary actions was remote.

7.9.6.7 Several key risk controls are committed to reduce the impact on emergency response during construction:

- An ERCoP will be developed to facilitate information sharing regarding the offshore wind farm and SAR organisations
- Periodic exercises will be undertaken at the site to prepare for incident response
- Two lines of orientation and a regular layout of structures
- Wind turbine (and OSP) spacing within and between rows will be at least 1,400 m, far exceeding SAR minimum requirements of 500 m
- A Design Plan, which includes a plan of the Morgan Array Area will be prepared and submitted to the MMO for approvals in consultation with MCA and Trinity House prior to commencement of construction
- Furthermore, a buoyed construction area, AtoNs and promulgation measures will reduce the likelihood of third party vessels being involving in an incident within the shipping and navigation study area.

7.9.6.8 The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.6.9 Whilst reduction in SAR capability could impact the likelihood of a successful rescue and could therefore have potentially high consequences, compliance with guidance and best practice would mitigate this impact.

7.9.6.10 The sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.6.11 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea, albeit the Morgan Generation Assets will follow best practice to minimise this impact.

Operations and maintenance phase

7.9.6.12 The presence of infrastructure within the Morgan Array Area, whether under construction or operations and maintenance, will have a similar effect on SAR. During construction, there may be partially constructed wind turbines, an irregular development site or the presence of jack ups which pose additional hazards. There would however be a greater duration of impact during the operations and maintenance phase than the construction phase. The impacts to emergency response during operations and maintenance are therefore not anticipated to be substantially different to those during construction.

7.9.6.13 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea, albeit the Morgan Generation Assets will follow best practice to minimise this impact.

Decommissioning phase

7.9.6.14 The impacts to emergency response during decommissioning are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.6.15 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea, albeit the Morgan Generation Assets will follow best practice to minimise this impact.

7.9.7 Impact on vessel to vessel collision risk

7.9.7.1 The construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets may lead to increased vessel to vessel collision risk. The MDS is represented by the maximum extent of the Morgan Array Area, the greatest number of vessel movements and the maximum duration of the Morgan Generation Assets and is summarised in Table 7.16.

7.9.7.2 The assessment of collision risk has assumed that all vessels will comply with their obligations under the COLREGs, SOLAS and undertake prudent passage planning.

Construction phase

Magnitude of impact

7.9.7.3 During construction, vessel traffic would be displaced from the Morgan Array Area due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain safe passing distance of at least 1 nm from navigational hazards. Furthermore, there is insufficient spacing between wind turbines for a commercial vessel to safely navigate. Therefore, section 7.9.3 identifies that both cargo/tanker and ferry vessel routes will be deviated around the Morgan Array Area which will result in a convergence of vessel routes to the southwest of the Morgan Array Area, and between the Morgan Array Area and Walney Offshore Wind Farms.

7.9.7.4 The construction base or bases for the Morgan Generation Assets are not yet determined, but there is potential for construction vessels in transit to the Morgan Array Area to be involved in a collision with other navigating vessels.

7.9.7.5 The hazard workshops and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement highlighted that several collision hazards were likely to occur within the shipping and navigation study area during the Morgan Generation Assets duration, involving ferries, cargo/tanker, fishing, recreational craft and Morgan Generation Assets vessels.

7.9.7.6 The confluence of traffic between the Morgan Array Area and the Walney Offshore Wind Farms will inevitably increase vessel encounters and therefore potential collision situations. The resulting route between these two wind farms would be 11.4 nm in length and at least 4.5 nm in width, with approximately 2,000 large vessel movements per year with some fishing, service and recreational activity. Modelling undertaken within the NRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) suggests that there would be a 29% increase in the number of encounters between involving ferries and other large commercial vessels and a 28% increase in encounters between large commercial vessels and small craft. A negligible change in encounters between cargo/tanker and cargo/tanker vessels was recorded given the low number of movements in the shipping and navigation study area. Whilst it is highly unlikely that most of these situations will result in a collision, there will be some residual increase in risk.

7.9.7.7 During full bridge simulations with ferry operators, collision situations were tested in normal and adverse weather conditions around the Morgan Array Area, particularly when navigating between the Morgan Array Area and Walney Offshore Wind Farms. It was demonstrated that the post PEIR revised boundary, enabled the bridge teams to take appropriate action as required by the COLREGs for complex, realistic traffic situations where they were give way vessel whilst maintaining a desired Closest Point of Approach (CPA) of at least 1.0 nm from other vessels and structures. It was noted that with the presence of the Morgan Array Area, the master may be more frequently called to the bridge than at present to support the bridge team in managing these situations. Furthermore, it was noted that what were challenging situations and failed runs with the Morgan Potential Array Area were much improved following the amendments made to the Morgan Array Area boundary.

7.9.7.8 Quantitative risk modelling using the IALA Waterway Risk Assessment Program (IWRAP) was undertaken within the NRA for large commercial vessels (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement). With an estimated 15% increase in vessel traffic, the collision risk modelling estimated an increase in collision risk between ferries increasing from once in 1,823 years (base case without the Morgan Array Area) to once in 1,476 years (future case with the Morgan Array Area). For cargo/tanker vessels in collision with ferries, or cargo/tanker vessels in collision with other cargo/tanker vessels, the modelled collision frequencies were less than once in 10,000 years given the low density of cargo/tanker vessel traffic.

7.9.7.9 During construction, it is likely that recreational craft on passage will avoid the Morgan Array Area. This will offset their transits into adjacent waters. However, analysis of recreational activity in section 7.5 demonstrated relatively few movements through the Morgan Array Area, and therefore would be unlikely to be involved in a collision.

7.9.7.10 Large parts of the Irish Sea are fished and during construction, fishing may be displaced into adjacent waters which increases the risk of collision. This is referred to as Spatial Squeeze, for which the National Federation of Fishermen's Organisations (NFFO) and Scottish Fishermen's Federation recently published a report (NFFO,

2022). Several consultees noted that whilst there was likely to be some fishing between the Morgan Array Area and Walney Offshore Wind Farms, the highest density of fishing may be encountered clear to the northwest of the Morgan Array Area associated with the Isle of Man scallop fishery for which vessels routinely avoid at present.

7.9.7.11 The majority of large construction vessels will be travelling at low speed within the Morgan Array Area. Whilst the route taken by construction vessels is not known, it is likely that they would infrequently cross shipping routes. There is, therefore, limited risk of collision by navigating vessels.

7.9.7.12 The presence of the wind turbines may block or hinder the view of other vessels, resulting in 'blind spots' which could increase the risk of collision by reducing the capability for early and effective collision avoidance. Vessels may be visually less distinct amongst the wind turbines and less prominent through radar, particularly at night and in poor visibility. The minimum spacing of 1,400 m makes such situations unlikely, particularly when compared to other offshore wind farms in the Irish Sea. As part of the navigation simulations, night navigation was also tested and it was concluded that the presence of the Morgan Array Area did not interfere with the normal ability to safely determine the nature and aspect of other traffic at night.

7.9.7.13 Most commercial ships would transit at least 1 nm from the Morgan Array Area. For a fishing boat or recreational craft emerging from the wind turbines boundary at six knots, it would take 10 minutes to intersect the commercial ships path. For a CTV at 25 knots, this is reduced to 2.4 minutes, albeit these vessels would carry AIS so would be more prominent. Such challenges currently exist for the established Irish Sea offshore wind farms but are being successfully managed by maintaining safe passing distances with no reported collisions as a direct result of reduced visibility of emerging vessels.

7.9.7.14 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the construction area
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- A buoyed construction area and safety zones will offset third party traffic and construction vessels
- Two lines of orientation and a regular layout of structures
- Wind turbine (and OSP) spacing between and within rows will be at least 1,400 m
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Marine co-ordination will promote best practice during construction activities within the Morgan Array Area
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

7.9.7.15 Given the results of the modelling and findings of the navigation simulations which suggest a relatively low likelihood of collision, the magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.7.16 Analysis of MAIB incident data suggests that approximately 1% of collisions would result in loss of life. Collisions between commercial vessels, even at speed, often result in only damage and no pollution or injuries (MAIB 7/2018, 28/2015, 3/2017, 15/2013).

7.9.7.17 Several consultees noted that a collision between a large commercial ship or ferry with a small craft such as fishing boat would likely result in the loss of the small craft and multiple fatalities (7/2007, 10/2015). However, the data indicates a more likely outcome would be serious damage to the small craft and either no or minor injuries or pollution (MAIB 4/2019, 16/2015, 20/2011, 17/2011).

7.9.7.18 During the hazard workshops, some consultees made reference to the relatively fragile structural integrity of the Manannan high speed ferry, these vessels, having been designed for high-speed transit and of aluminium construction. Therefore, any collision involving this vessel could have a higher potential consequence.

7.9.7.19 The NRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) concluded that a most likely outcome for a ferry or passenger ship would be multiple injuries, moderate damage, minor pollution and widespread adverse publicity, with a worst credible outcome resulting in multiple loss of life. The most likely outcome for small craft would be minor injuries, minor damage and no pollution. Less numerous loss of life as compared to ferry collisions was identified as a worst credible outcome for all other large vessel types. Stakeholders requested that the worst credible outcome for a large vessel in collision with a small vessel would be multiple loss of life with the loss of the vessel and the risk assessment was amended to reflect this.

7.9.7.20 The consequences of a collision during construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- ERCoP to effectively respond to an incident
- Marine Pollution Contingency Plan
- Periodic exercises and training.

7.9.7.21 The sensitivity of the receptor is therefore, considered to be **high**.

Significance of the effect

7.9.7.22 Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement assessed seven collision hazards which occurred during the construction phase of the Morgan Generation Assets. Of these hazards, three were scored as Medium Risk – Tolerable if ALARP, namely, the risk of collision between a ferry/passenger vessel or cargo/tanker and a small craft (such as fishing, recreational or project vessel), the risk of collision between a ferry/passenger and a cargo/tanker or other ferry/passenger and the risk of collision between two small craft. The remaining four hazards were scored as Low Risk – Broadly Acceptable. The highest collision hazards related to collisions involving large commercial vessels, particularly ferries, with each other or with small craft where there was the greatest potential for fatalities. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

7.9.7.23 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

7.9.7.24 During the operations and maintenance phase of the Morgan Generation Assets, large commercial vessels will be deviated around the Morgan Array Area, and therefore many of the impacts on cargo, tanker and ferries would not be substantially different to those during construction. During both the construction and the operations/ maintenance phases of the Morgan Generation Assets, large commercial ships will not be able to transit through the Morgan Array Area, whether through the presence of construction buoyage or structures and therefore the impact on vessel routeing will be the same, albeit for different durations.

7.9.7.25 The hazard workshop and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement, highlighted that several collision hazards could occur within the shipping and navigation study area during the Morgan Generation Assets duration, involving ferries, cargo/tanker, fishing, recreational craft and project vessels. These impacts were considered similar to those expected during the construction phase of the Morgan Generation Assets.

7.9.7.26 There may be up to 719 Morgan Generation Assets vessel movements per year which could increase the risk of collision with other vessels. The operations and maintenance base or bases for the Morgan Generation Assets has not yet been determined, but it is likely that the route taken by these vessels would need to cross busy shipping lanes and therefore regularly interact with other passing vessels.

7.9.7.27 During the operations and maintenance phase, small craft will be able to navigate through the Morgan Array Area. Whilst it is possible that both fishing and recreational vessels may be offset from the Morgan Array Area in a similar manner to that described during the construction phase, the absence of restrictions would mean that they would be less effected. Evidence from existing offshore wind farms in the Irish Sea suggest that both fishing activity and recreational cruising does take place between wind turbines, even with far narrower spacing than the Morgan Array Area (less than 1 km).

7.9.7.28 The operations and maintenance phase will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the Morgan Array Area
- Two lines of orientation and a regular layout of structures
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Two lines of orientation and a regular layout of structures
- Wind turbine and OSP spacing between and within rows will be at least 1,400 m
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Marine co-ordination will promote best practice during maintenance activities within the site (Document Reference J17).

7.9.7.29 Given the results of the modelling and findings of the navigation simulations which suggest a relatively low likelihood of collision, the magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.7.30 The consequences of collision would not be substantially different to those described during construction. The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

7.9.7.31 Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement assessed six collision hazards which occurred during the operations and maintenance phase of the Morgan Generation Assets. Of these five were scored as Medium Risk – Tolerable if ALARP, whilst a cargo/tanker in collision with a cargo/tanker was scored as Low Risk – Broadly Acceptable. These include the risk of collision between ferries, small craft and Morgan Generation Assets operations and maintenance vessels. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

7.9.7.32 Overall, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

7.9.7.33 The impacts to vessel to vessel collision risk during the decommissioning phase are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.7.34 Therefore, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

7.9.8 Impact on allision (contact) risk to vessels

7.9.8.1 The construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets may lead to increased allision risk between navigating vessels and structures. The MDS is represented by the maximum extent of the Morgan Array Area, the greatest number of structures, the greatest size of structures, the minimum spacing between structures and the greatest number of vessel movements and is summarised in Table 7.16.

Construction phase

Magnitude of impact

7.9.8.2 The construction of additional structures within the shipping and navigation study area increases the likelihood that contact occurrences will materialise, such instances are likely to occur through human error or mechanical failure. During construction, this is exacerbated by the partially constructed nature of the Morgan Array Area.

7.9.8.3 For vessels navigating adjacent to the Morgan Array Area, engine failure could cause them to drift and allide with a structure, or human error or steering failure could lead to a powered allision with a wind turbine or OSP. The Morgan Array Area is adjacent to several ferry routes with 5,300 ferry movements per year within the shipping and navigation study area. The majority of other large commercial shipping routes are further to the southwest from the Morgan Array Area. However, it is notable that there have been no reported incidents with respect to a commercial vessel allision with any of the existing offshore wind farms in the Irish Sea.

7.9.8.4 Quantitative risk modelling using IWRAP was undertaken within the NRA for large commercial vessels (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement). The modelling results indicated that the risk of allision with the Morgan Array Area, accounting for a 15% increase in traffic, would be once in 4,036 years for cargo/tanker shipping and once in 779 years for ferries. The modelling identified that the greater risk was with isolated oil and gas structures which are located closer to the existing shipping routes than the Morgan Array Area. It is noted that the Millom West platform will be decommissioned towards the end of construction and therefore these risk results are conservative. Within the Morgan Array Area, the relatively higher risk is located to the west of the Morgan Array Area, close to the Liverpool to Douglas route, and to the south as vessels bound for Heysham pass south of the Morgan Array Area.

7.9.8.5 During full bridge simulations with ferry operators (see Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) several runs tested the safety of navigating adjacent to the Morgan Array Area in both complex, realistic traffic scenarios and adverse weather. In all completed runs, it was demonstrated that the bridge teams were able to successfully respond to the situations whilst maintaining adequate CPA from other vessels and structures. It was noted that with the presence of the Morgan Array Area, the master may be more frequently called to the bridge than at present to support the bridge team in managing these situations. Furthermore, it was noted that what were challenging situations and failed runs with the Morgan Potential Array Area were much improved following the amendments made to the Morgan Array Area boundary.

7.9.8.6 Allision risks with existing oil and gas infrastructure as a result of the presence of the Morgan Generation Assets were also highlighted during the hazard workshops. The NRA identified that the relative locations of the Morgan Array Area, shipping routes and oil/gas infrastructure was unlikely to have an appreciable effect on this hazard.

7.9.8.7 During construction activities there will be up to 1,929 installation vessel movements. Construction vessels within the Morgan Array Area are inherently operating in close proximity to structures and therefore allisions are potentially more likely to occur. Historical incident analysis at other offshore wind farms within the UK demonstrates that these incidents do occur, and that they are more likely during construction than decommissioning (see section 7.5).

7.9.8.8 Analysis of vessel traffic in the shipping and navigation study area (section 7.5) demonstrates that there are fishing and recreational movements. During the construction phase, additional risk controls are proposed to manage navigating within the construction area. These include the use of guard vessels, notice to mariners and safety zones which will deter smaller craft such as fishing and recreational vessels from navigating through the construction area. However, given the size of the construction site, it would still be credible that a small craft enters the Morgan Array Area and contacts a partially constructed structure.

7.9.8.9 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the construction area
- Application for safety zones to separate construction activities from vessel traffic
- Guard vessels to manage vessel safety
- Blade clearance of at least 22 m from MHWS to avoid mastheads

- Two lines of orientation and a regular layout of structures
- Wind turbine (and OSP) spacing between and within rows will be at least 1,400 m
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- A buoyed construction area and safety zones will offset third party traffic and construction vessels
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Marine co-ordination will promote best practice during construction activities within the site (Document Reference J17)
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

7.9.8.10 Given the modelling results and findings of the navigation simulations demonstrating sufficient sea room exists for vessels to avoid the Morgan Array Area, the magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.8.11 There have been few reported allisions between navigating vessels and offshore wind farm structures. Analysis of case studies and academic research within Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement reached the following conclusions. Firstly, most allisions within offshore wind farms occur at slow speed, involving project vessels, and result in minor damage to the vessel, the wind turbine and rarely result in injuries or pollution. Secondly, were a large ship to collide with a wind turbine, this would typically be at low speed due to drifting and there would be minimal damage. However, there is the potential for catastrophic wind turbine collapse or holing of the commercial ship below the waterline that results in flooding.

7.9.8.12 During the hazard workshops it was agreed amongst stakeholders that an allision event would carry a lower potential consequence than that of collision. The NRA concluded that a most likely outcome for a ferry or passenger ship would be multiple injuries, moderate damage, minor pollution (Tier 1) and widespread adverse publicity, with a worst credible outcome resulting in multiple loss of life. The most likely outcome for small craft was minor injuries, minor damage and no pollution. Less numerous loss of life as compared to ferry allisions was identified as a worst credible outcome for all other vessel types, including small craft. Allision risk involving oil and gas infrastructure was scored more highly than with wind turbines given the greater potential loss of life and pollution.

7.9.8.13 The consequences of an allision during construction activities will be managed through adopted risk controls listed in Table 7.17:

- ERCoP to effectively respond to an incident
- Marine Pollution Contingency Plan
- Periodic exercises and training.

7.9.8.14 Given the types of consequences of allisions described above, the sensitivity of the receptor is therefore, considered to be **medium**.

Significance of the effect

7.9.8.15 Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement assessed seven allision hazards which occurred during the construction phase of the Morgan Generation Assets. Six of these hazards were scored as Medium Risk – Tolerable if ALARP with an allision involving a cargo/tanker scored as Low Risk – Broadly Acceptable. The two highest scoring allision hazards were allisions between navigating ferry/passenger vessels with Morgan Generation Assets wind turbines or OSPs and fishing vessels with Morgan Generation Assets wind turbines or OSPs. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

7.9.8.16 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

7.9.8.17 During the operations and maintenance phase of the Morgan Generation Assets, the presence of the fully constructed Morgan Array Area exposes large commercial vessels to similar impacts as during the construction phase. However, it is likely that operators will be more familiar to the layout and presence of the Morgan Array Area following four years of construction.

7.9.8.18 During the operations and maintenance phase of the Morgan Generation Assets, there is likely to be greater small craft traffic navigating through the Morgan Array Area than during the construction phase, during which time navigation is more restricted. It is anticipated that some fishing vessels will continue to fish within the Morgan Array Area, given at least 1,400 m between wind turbines and a regular layout. This spacing is anticipated to facilitate fishing by small craft without unacceptable increases in risk of allision. However, whilst recreational craft are able to navigate through an operational offshore wind farm, consultation with the RYA suggests that only a minority are choosing to do so at other sites.

7.9.8.19 The most likely allision with a structure is anticipated to involve a fishing boat or a Morgan Generation Assets maintenance vessel. Fishing is anticipated to continue to take place between the turbines within the Morgan Array Area. There may be up to 719 Morgan Generation Assets vessel movements per year which due to proximity in which vessels of this type navigate to structures, and their greater numbers, increases the risk of allision as compared to other vessel types.

7.9.8.20 The operations and maintenance activities will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the Morgan Array Area
- Blade clearance of at least 22 m from MHWS to avoid mastheads
- Two lines of orientation and a regular layout of structures
- Wind Turbine (and OSPs) spacing will be at least 1,400 m
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning

- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Marine co-ordination will promote best practice during operations and maintenance activities within the site (Document Reference J17)
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

7.9.8.21 The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.8.22 The consequences of allision would not be substantially different to those described during construction. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

7.9.8.23 The NRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) assessed seven allision hazards which occurred during the operations and maintenance phase of the Morgan Generation Assets. Most of these hazards were scored as Medium Risk – Tolerable if ALARP, with two scored as Low Risk – Broadly Acceptable. The two highest scoring allision hazards were allisions between navigating ferry/passenger vessels with Morgan Generation Assets wind turbines or OSPs and fishing vessels with Morgan Generation Assets wind turbines or OSPs. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

7.9.8.24 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

7.9.8.25 The impacts to allision risk are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.8.26 The magnitude of the impact is therefore deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

7.9.9 Impact on marine navigation, communications and position fixing equipment

7.9.9.1 The construction, operations/maintenance and decommissioning phases of the Morgan Generation Assets may lead to impacts on marine navigation, communications and position fixing equipment. The MDS is represented by the maximum extent of the Morgan Array Area, the greatest number of structures, the greatest size of structures and the minimum spacing between structures and is summarised in Table 7.16.

Construction phase

Magnitude of impact

7.9.9.2 Offshore wind farms can have adverse effects on shipboard equipment necessary for navigation, communications and position fixing. Several studies have sought to better understand this impact including MCA and QinetiQ (2004) the British Wind Energy Association (2007) and Ocean Studies Board's Division on Earth and Life Studies (2022). These impacts are also recognised in MGN654.

7.9.9.3 No discernible impact to passing vessels was identified to VHF, AIS, Global Navigation Satellite System or compasses. Nor was the sound generated by wind turbines likely to mask the navigational sound signals made by vessels as per the COLREGs.

7.9.9.4 These studies have identified that wind turbines, like other structures, can result in spurious radar returns such as side lobes, echoes, reflections and blanketing. This can reduce the capability of tracking small vessels when navigating near to offshore wind farms. Given that vessels would pass adjacent to the Morgan Array Area, these effects could be experienced, and is exacerbated by the proximity with the Walney Offshore Wind Farms.

7.9.9.5 The Morgan Generation Assets is outside of any harbour areas and the region is not monitored by Vessel Traffic Services, and therefore the impacts to shore radar are low.

7.9.9.6 The magnitude is therefore, considered to be **medium**.

Sensitivity of the receptor

7.9.9.7 Interference with radar could reduce the effectiveness of collision avoidance, increasing the risk of an incident. MGN654 recognises that these effects are greatest within 0.5 nm of an offshore wind farm but could be experienced up to 1.5 nm from the wind farm boundary. For vessels navigating adjacent to the Morgan Array Area, this is closer than most large vessels would pass based on prudent passage planning and therefore minimal effects should be experienced. However, whilst navigating the route between the Morgan Array Area and Walney Offshore Wind Farms, vessels will need to pass closer to the wind turbines, exacerbating these effects. There may be some reduction in the ability to track small craft within the Morgan Array Area, which is discussed in section 7.9.7.

7.9.9.8 These effects are routinely experienced by operators passing the existing Irish Sea offshore wind farms and therefore mariners should be experienced in mitigating their effects.

7.9.9.9 The sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.9.10 Overall, the magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the proximity of large numbers of vessel transits to the Morgan Array Area, but the low likelihood that this would result in an incident.

Operations and maintenance phase

7.9.9.11 The impacts to marine navigation, communications and position fixing equipment are not anticipated to be substantially different to those during construction, albeit for a longer duration. The greater extent of structures across the Morgan Array Area for a fully constructed offshore wind farm as opposed to a partially constructed one may

widen these effects. However, it is not considered that this would increase the significance of this impact.

7.9.9.12 The magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the proximity of large numbers of vessel transits to the Morgan Array Area, but the low likelihood that this would result in an incident.

Decommissioning phase

7.9.9.13 The impacts to marine navigation, communications and position fixing equipment are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.9.14 The magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the proximity of large numbers of vessel transits to the Morgan Array Area, but the low likelihood that this would result in an incident.

7.9.10 Impact on recreational craft passages and safety

7.9.10.1 The construction, operations/maintenance and decommissioning phases of the Morgan Generation Assets may lead to impacts to recreational craft passages and safety. The MDS is represented by the maximum extent of the Morgan Array Area, the greatest number of structures, the lowest blade tip height of structures and the minimum spacing between structures and is summarised in Table 7.16.

Construction phase

Magnitude of impact

7.9.10.2 During the construction phase, additional risk controls are proposed to manage navigating within the construction area. These include the use of guard vessels and safety zones which will deter recreational vessels from navigating through the Morgan Array Area construction areas.

7.9.10.3 Analysis of vessel traffic (section 7.5) demonstrates that there are few recreational movements through the shipping and navigation study area. During the winter vessel traffic surveys, no recreational craft were detected, and during the summer survey on average, less than one per day was detected by either AIS or Radar. This suggests that relatively few recreational users would be adversely impacted. It is known that there are occasional regattas or rallies that cross between the UK and the Isle of Man.

7.9.10.4 The construction activities will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners will ensure approaching vessels can safely avoid the Morgan Array Area
- Blade clearance of at least 22 m from MHWS to avoid mastheads
- Commitments to layout including wind turbine and spacing and lines of orientation to facilitate internal navigation where safe to do so

- Marking and charting of Morgan Array Area on nautical charts to facilitate safe passage planning.

7.9.10.5 The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.10.6 The two most prominent cruising routes identified through analysis of the AIS data and the RYA Coastal Atlas which intersect the Morgan Array Area are between Liverpool - Douglas and Morecambe Bay-Douglas. Both of these routes would require a minor deviation to pass clear of the Morgan Array Area, should the skipper decide not to navigate between the wind turbines.

7.9.10.7 This additional distance would be in the order of less than 2 nm and given the slower speed that yachts travel as compared to commercial vessels, may necessitate an additional 30 minutes of cruising. During consultation, potential impacts on vessel routeing due to tidal gates were discussed which might make any deviations more costly for cruising vessels or else encounter adverse tidal conditions or insufficient water depths. Given the spacing of wind turbines which would support navigation through the Morgan Array Area, this could be factored into the cruising passage plan to mitigate its effects.

7.9.10.8 The sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.10.9 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the presence of the Morgan Generation Assets is not anticipated to have an impact on inshore recreational activity, there will be some effect on offshore recreational cruising.

Operations and maintenance phase

7.9.10.10 During the operations and maintenance phase of the Morgan Generation Assets, there is likely to be greater small craft traffic navigating through the Morgan Array Area than during the construction phase, during which time navigation is more restricted. Given at least 1,400 m between wind turbines and a regular layout, recreational craft could navigate through the Morgan Array Area without unacceptable increases in risk. However, consultation with the RYA suggests that only a minority are choosing to do so at other sites. This may result in greater numbers of recreational craft navigating around the Morgan Array Area, increasing transit durations.

7.9.10.11 As a result, these impacts are not anticipated to be substantially different to those during construction and likely have a lower adverse impact.

7.9.10.12 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the presence of the Morgan Generation Assets is not anticipated to have an impact on inshore recreational activity, there will be some effect on offshore recreational cruising.

Decommissioning phase

7.9.10.13 The impacts to recreational craft are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as

decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.10.14 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the presence of the Morgan Generation Assets is not anticipated to have an impact on inshore recreational activity, there will be some effect on offshore recreational cruising.

7.9.11 Impact on snagging risk to vessel anchors and fishing gear

7.9.11.1 The construction, operations/maintenance and decommissioning phases of the Morgan Generation Assets may lead to an increased risk of snagging of fishing gear and ship anchors. The MDS is represented by the longest length of cables, minimum cable burial depth and maximum length of cable protection over the greatest duration and is summarised in Table 7.16.

Construction phase

Magnitude of impact

7.9.11.2 Subsea cables are both at risk of anchor or fishing gear strikes and can pose a hazard to navigating vessels were gear attached to the vessel to become snagged. Within the Morgan Array Area, with inter array and interconnector cables, the use of safety zones and guard vessels will reduce the risk of snagging during the construction phase. The cable is intended to be buried, to a depth of at least 0.5 m. Where burial is not possible, cable protection may be required up to a height of 3 m.

7.9.11.3 Given that there are no anchorages in proximity to the Morgan Array Area, the likelihood of a vessel dragging its anchor and striking a cable is remote.

7.9.11.4 Commercial ships may choose to deploy an anchor in an emergency, and whilst uncommon, this could result in cable snagging. Given the depths of water, it is unlikely that any recreational or small craft anchoring would take place near to the Morgan Array Area cables.

7.9.11.5 There is significant fishing activity near to the Morgan Array Area, including both static and mobile gear types and therefore snagging could occur during construction. However, significant controls will be put in place to mitigate the likelihood of this occurrence.

7.9.11.6 Cable burial would mitigate the risk of snagging, and a CBRA within the CSIP has been committed by the Morgan Generation Assets to ensure these risks are adequately addressed for the types of gear used within the shipping and navigation study area. Where the cable is buried, it will be periodically inspected and where necessary remedial action taken. A Fisheries Liaison and Coexistence Plan will be developed post consent to minimise the risk of gear snagging along the cable route. An Outline of this plan is submitted with this application (Document Reference J11)

7.9.11.7 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation such as Notice to Mariners and site marking and charting issued to warn vessels of the presence of the Morgan Generation Assets
- Application for safety zones to separate construction activities and vessel navigation

- Guard Vessels to manage vessel safety
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Emergency response capabilities including an ERCoP, Marine Pollution Contingency Plan, periodic exercises to minimise the consequences of any incident
- A CBRA will ensure adequate cable burial or protection
- Cable protection shall be designed to minimise snagging hazards, for example by minimising height above seabed, and or using smooth or shallower profiles.

7.9.11.8 The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

7.9.11.9 Were a fishing vessel to snag the cable, the most likely outcome is loss of gear and potentially minor damage to the cable. A worst credible outcome however is the loss of the fishing vessel as it capsizes, which may also result in potential fatalities.

7.9.11.10 Snagging of commercial vessel anchors is unlikely to result in serious consequences such as fatalities, pollution or serious damage to the vessel but could result in significant damage to the cable or cables. There is the potential for the presence of the cables to influence a master's decision making not to anchor to avoid an incident such as a collision, allision or grounding. However, this is not considered credible as the master would likely act to minimise any risk to the vessel.

7.9.11.11 The sensitivity of the receptor is therefore, considered to be **low**.

Significance of the effect

7.9.11.12 Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement assessed four snagging hazards which occurred during the construction phase of the Morgan Generation Assets. Of these two were scored as Medium Risk – Tolerable if ALARP. Firstly, the risk of snagging of fishing gear and secondly the risk of snagging large or small project vessel anchors. The two remaining snagging hazards, for cargo/tanker/ferry and recreational/tug and service vessels were scored as Low Risk – Broadly Acceptable. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

7.9.11.13 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the Morgan Generation Assets cables will be buried, there is a high volume of fishing activity adjacent to the site.

Operations and maintenance phase

7.9.11.14 The impacts due to the risk of snagging are not anticipated to be substantially different to those during construction, albeit for a longer duration. However, given the removal of restrictions on navigation that are in place during construction, and the wind turbine spacing in excess of 1,400 m between wind turbines, there may be greater fishing activity within the Morgan Array Area posing a risk of snagging of inter array cables.

7.9.11.15 Conversely, during the operations and maintenance phase, there should be no partially buried or unprotected infrastructure as might occur temporarily during the

construction phase. Furthermore, regional fishermen will be more familiar with the site layout and able to avoid fishing in a manner which could lead to a risk of snagging.

7.9.11.16 The risk of snagging during the operations and maintenance phase will be managed through adopted risk controls listed in Table 7.17:

- Promulgation such as Notice to Mariners and site marking and charting issued to warn vessels of the presence of the Morgan Generation Assets
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets in accordance with the Outline FLCP (Document Reference J11)
- Emergency response capabilities including an ERCoP, Marine Pollution Contingency Plan, periodic exercises to minimise the consequences of any incident
- A CBRA will ensure adequate cable burial or protection
- Cable protection shall be designed to minimise snagging hazards, for example by minimising height above seabed, and or using smooth or shallower profiles.

7.9.11.17 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the Morgan Generation Assets cables will be buried, there is a high volume of fishing activity adjacent to the site.

Decommissioning phase

7.9.11.18 The impacts due to the risk of snagging are not anticipated to be substantially different to those during construction. However, it should be noted that the impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

7.9.11.19 All cables will be removed during decommissioning so as not to leave any snagging hazards on the seabed.

7.9.11.20 The magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that whilst the Morgan Generation Assets cables will be buried, there is a high volume of fishing activity adjacent to the site.

7.9.12 Future monitoring

7.9.12.1 Table 7.27 below outlines the proposed monitoring commitments for shipping and navigation. These monitoring commitments are accepted, industry standard methods by which the impacts to shipping and navigation can be scrutinised and ensure the predictions of the NRA are consistent with the realised impacts and therefore that the risk control options are appropriate and proportionate.

Table 7.27: Monitoring commitments.

Environmental effect	Monitoring commitment	Means of implementation
All impacts on vessel routeing and safety	Preparation and adherence to a Navigation Monitoring Strategy for construction and post-construction monitoring of marine traffic (by AIS) with a report submitted	Navigation Monitoring Strategy secured within the deemed marine licences within the draft DCO.

Environmental effect	Monitoring commitment	Means of implementation
	annually to MMO, MCA and Trinity House. The report will assess the extent to which the impacts predicted in the NRA are accurate to ensure adopted risk controls are fit for purpose. An Offshore In-principle Monitoring Plan will set out the navigation monitoring strategy, including vessel traffic monitoring by AIS. An outline of the plan has been submitted with the Application, Document Reference J12	
Impact on allision (contact) risk to vessels	Preparation and adherence to an ANMP which includes AtoN monitoring to ensure constant functionality through the lifetime of the Morgan Generation Assets. Trinity House to be informed of any defects. An ATNP will be finalised and approved in consultation with MCA and Trinity House.	ANMP is secured within the deemed marine licences within the draft DCO.
Impact on snagging risk to vessel anchors and fishing gear	Preparation and adherence to an Offshore CMS which includes details of cable monitoring of cable burial and protection status to ensure specified requirements are met.	Offshore CMS with details of cable monitoring secured within the deemed marine licences within the draft DCO.

7.10 Cumulative effects assessment methodology

7.10.1 Methodology

7.10.1.1 The CEA takes into account the impact associated with the Morgan Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, the Morecambe Offshore Windfarm: Generation Assets, and other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 5, Annex 5.1: CEA screening matrix of the Environmental Statement). Each project has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

7.10.1.2 The shipping and navigation CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. The cumulative assessment considers three scenarios;

- Scenario 1: Morgan Generation Assets plus Morgan and Morecambe Offshore Wind Farms: Transmission Assets,
- Scenario 2: Morgan Generation Assets plus Morgan and Morecambe Offshore Wind Farms: Transmission Assets and the Morecambe Offshore Windfarm: Generation Assets.
- Scenario 3: Morgan Generation Assets plus Morgan and Morecambe Offshore Wind Farms: Transmission Assets alongside all other projects, plans and activities. This assessment has been allocated into 'tiers' reflecting the current stage of the other projects, plans and activities within the planning and development process. This tiered approach is adopted to provide a clear

assessment of the Morgan Generation Assets and Morgan and Morecambe Offshore Wind Farms: Transmission Assets alongside other projects, plans and activities:

- Tier 1: includes projects, plans and activities at the following stages:
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact.
- Tier 2: includes projects, plans and activities at the following stages:
  - Scoping report has been submitted and is in the public domain.
- Tier 3 includes projects, plans and activities at the following stages:
  - Scoping report has not been submitted and is not in the public domain
  - Identified in the relevant Development Plan
  - Identified in other plans and programmes.

7.10.1.3 This approach to CEA has been developed to provide an assessment of the Morgan Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (Scenario 1) and the Morecambe Offshore Windfarm: Generation Assets (Scenario 2) in order to identify, as far as possible, the combined effects of these three applications separately from the assessment that includes all other projects, plans and activities (Scenario 3).

7.10.1.4 The specific projects, plans and activities scoped into the CEA, are outlined in Table 7.28 and shown in Figure 7.9.

7.10.1.5 Existing navigational activities, such as anchorages, pilot boarding stations and ferry routes are included within the baseline assessment. The baseline assessment also includes the ongoing effect of the existing Irish Sea offshore wind farms on shipping and navigation receptors. There is a recognised potential cumulative impact of the Morgan Generation Assets, with existing offshore wind farms in the Irish Sea, and the proposed Mona Offshore Wind Project Array Area, Morecambe Generation Assets Array Area and Awel y Môr Array Area. In particular, the development of all of these projects will result in constrained routes between them which was raised as a concern by many shipping and navigation consultees.

7.10.1.6 In light of this, the developers of the Irish Sea Round 4 projects (EnBW, bp, Cobra Instalaciones Servicios, S.A. and Flotation Energy plc) commissioned a joint CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement). The objective of the joint CRNRA was to enable stakeholders to engage with and understand the potential cumulative effects of the proposed Round 4 projects. Adopting a regional (collaborative) approach to assessment enabled the individual projects to quantify and manage the cumulative impacts in a coordinated, consistent and efficient manner. This was undertaken at an early stage to ensure that the potential impacts of all three East Irish Sea Round 4 projects are understood as early as possible. The CRNRA is contained within Volume 4, Annex 7.1 Navigational risk assessment of the Environmental Statement.

7.10.1.7 At the time of drafting the CRNRA to inform the PEIR, it was noted that an agreement for lease had been awarded to Orsted (subsequently Mooir Vannin Offshore Wind Farm Limited) in 2015 for an area of seabed in Isle of Man territorial waters,

approximately 6 nm to the east of the Isle of Man. Whilst some stakeholders had raised concerns during the NRA on the additional cumulative impact with this project, since 2015 no further information was made publicly available nor had a Scoping Report been issued publicly for the proposed development of the wind farm lease area and therefore its status was uncertain. Following the Planning Inspectorate's Advice Note Seventeen (Planning Inspectorate, 2019), the Mooir Vannin Offshore Wind Farm project was incorporated into the shipping and navigation assessments undertaken to inform the PEIR as a Tier 3 Project and therefore not incorporated into the drafting of the CRNRA undertaken to inform the PEIR as there was insufficient information available.

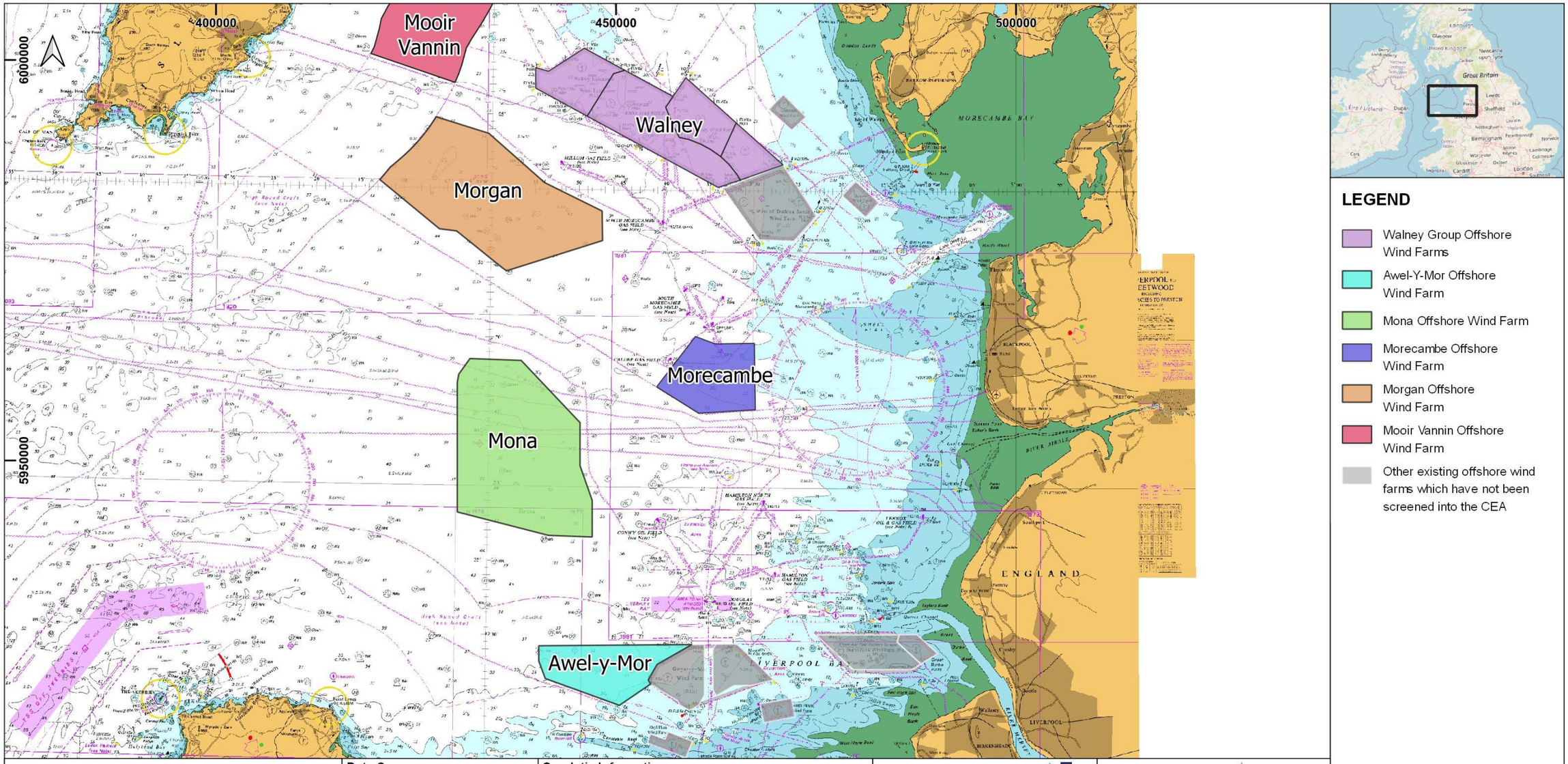
7.10.1.8 The PEIR response provided by Orsted (Mooir Vannin Offshore Wind Limited) in June 2023 to Morgan Generation Assets stated that a Scoping Report for the Mooir Vannin Offshore Wind Farm would be published in September or October 2023 and that Orsted would supply pre-scoping project details to allow its inclusion in the CRNRA undertaken to inform the Project's Environmental Statements. This information was provided on 01 September 2023. On 18 October 2023, Mooir Vannin Offshore Wind Farm Limited issued a Scoping Report with details of the proposed development of the Mooir Vannin Offshore Wind Farm (Mooir Vannin Offshore Wind Farm Limited, 2023) within the agreement for lease area.

7.10.1.9 The project information provided by Orsted on 01 September 2023, has been incorporated into the CRNRA undertaken to inform the Environmental Statement. This included undertaking some navigation simulations with the IoMSPC that included Mooir Vannin Offshore Wind Farm agreement for lease area, subsequently presented as the scoping boundary within the scoping report. Furthermore, the Mooir Vannin Offshore Wind Farm agreement for lease area was included within the hazard workshop undertaken to inform the Environmental Statement.

7.10.1.10 Following publication of its Scoping Report, the Mooir Vannin Offshore Wind Farm is now categorised as a Tier 2 Project using the Planning Inspectorate's Advice Note Seventeen (Planning Inspectorate, 2019). A Tier 2 Project is where a Scoping Report has been submitted for a project in the development pipeline. Given the timing of the provision of project information from Orsted and the release of the Mooir Vannin Offshore Wind Farm Scoping Report to the Application of the Morgan Generation Assets, a decision was taken by the Morgan Generation Assets to include the assessment of the Mooir Vannin Offshore Wind Farm project within an addendum to the CRNRA. This was to ensure that the Mooir Vannin Offshore Wind Farm was included within the cumulative assessment in a logical manner prior to submission of an application for Development Consent for Morgan Generation Assets.

Table 7.28: List of other projects, plans and activities considered within the CEA.

Project/Plan	Status	Distance from the Morgan Generation Assets (km)	Description of project/plan	Dates of construction and operation (if applicable) and temporal overlap with the Morgan Offshore Wind Project: Generation Assets
Tier 1				
Awel y Môr Offshore Wind Farm	Consented	46.8	Proposed offshore wind farm to the west of Gwynt y Môr. Maximum of 50 wind turbines and array area of 78 km^2.	Construction: 2025 to 2029 Operation: 2030
Mona Offshore Wind Project	Submitted application	11.1	Proposed offshore wind farm. Maximum of 96 wind turbines and four OSPs, with minimum spacing between wind turbines of 1,400 m. Area: 300 km^2.	Construction: 2026 Operation: 2030
Tier 2				
Morecambe Offshore Windfarm: Generation Assets	Pre-application	11.2	Proposed offshore wind farm. Maximum of 35 wind turbines and indicative minimum spacing between rows of wind turbines of 1,400 m. Area: 87 km^2.	Construction: 2026 Operation: 2030
Mooir Vannin Offshore Wind Farm	Pre-application	4.8	Proposed offshore wind farm. Maximum of 100 wind turbines. Array area: 253 km^2.	Construction: 2030 Operation: 2032



Service Layer Credits: © British Crown and OceanWise, 2023. All rights reserved. License No. EK001-FN1001-004281. OpenStreetMap contributors.	**Data Sources:** Admiralty Chart 1826.	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS89 / UTM zone 30N Scale@271.5mm x 154mm: 1:730,000	0 2.5 5 nm 0 5 10 km	NASH MARITIME	EnBW bp RPS A TETRA TECH COMPANY Partners in UK offshore wind
Project Name: MORGAN OFFSHORE WIND PROJECT	**Drawing Tile:** Cumulative Regional NRA Projects		**Drawing Number:** RPSE-MN-TEM-030-00		

VER	DATE	DETAILS	BY	CHECK
00	04-12-23	Initial Issue	ES	AR

The Awel y Môr agreement for lease area extends further to the west than the application boundary presented, however Awel y Môr Offshore Wind Farm Ltd. have decided to develop in the area presented

Figure 7.9: Cumulative Regional NRA Projects.

7.10.2 Maximum Design Scenario

7.10.2.1 The MDSs identified in Table 7.29 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The scenarios presented and assessed in this section have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project description of the Environmental Statement as well as the information available on other projects and plans, in order to inform an MDS. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 7.29: MDS considered for the assessment of potential cumulative effects on shipping and navigation.

[a] C=construction, O=operations and maintenance, D=decommissioning

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on recognised sea lanes essential to international navigation.
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on commercial operator routes.
Impact to adverse weather routeing.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on adverse weather routeing.

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Impact on access to ports and harbours.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on access to ports and harbours.
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on emergency response capability.
Impact on vessel to vessel collision risk.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on collision risk.
Impact on allision (contact) risk to vessels.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on allision risk.

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on marine navigation, communications and position fixing equipment.
Impact on recreational craft passages and safety.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on recreational craft.
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓	✓	Maximum design scenario as described for the Morgan Generation Assets (Table 7.16) assessed for each scenario and cumulatively with the following other projects/plans: **Tier 1** • Awel y Môr offshore wind farm • Mona Offshore Wind Project. **Tier 2** • Morecambe Generation Assets • Mooir Vannin Offshore Wind Farm.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered which result in the greatest impact on snagging of fishing gear or ship anchors.

7.11 Cumulative effects assessment

7.11.1 Introduction

7.11.1.1 A description of the significance of cumulative effects upon shipping and navigation receptors arising from each identified impact is given below.

7.11.1.2 The CEA is presented in a series of tables (one for each potential cumulative impact), and considers the following:

- Scenario 1: Morgan Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets

- Scenario 2: Morgan Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and the Morecambe Offshore Windfarm: Generation Assets
- Scenario 3: Morgan Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and with all other relevant Tier 1, Tier 2 and Tier 3 projects, although no Tier 3 projects were scoped into this CEA.

7.11.2 Impact on recognised sea lanes essential to international navigation.

Table 7.30: Impact on recognised sea lanes essential to international navigation.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Existing ship routeing measures are more than 20 nm from the Morgan Generation Assets and surface piercing structures as part of the Transmission Assets • A negligible number of vessels using the TSS would be affected by these cumulative projects • There is sufficient sea room around the Morgan Generation Assets and Transmission Assets for these vessels to navigate. The magnitude is therefore, considered to be **negligible.**	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Generation Assets are located clear of major shipping routes and therefore the cumulative effect is not anticipated to be materially different to that described in Scenario 1. The magnitude is therefore, considered to be **negligible.**	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers the following: • The Mona Array Area and Awel y Môr/Gwynt y Môr array areas are located more than 7 nm apart with the Liverpool Bay TSS and its approaches located directly between them • Within this route, approximately 10,000 commercial ships would pass each year in addition to the potential for construction vessel movements associated with the offshore wind farms • The majority of vessel traffic using the TSS passes directly east-west to the Off Skerries TSS or the wider Irish Sea and therefore passes clear of the wind farms. Vessel traffic approaching from the northwest can continue to do so having deviated to pass to the southwest of the Mona Array Area. Vessel traffic approaching from the anchorage to the east of Anglesey can continue to do so having deviated to

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			pass to the northwest of the Awel y Môr array area • Other Tier 1, Tier 2 and Tier 3 projects are far enough from the TSSs so as not to pose a direct impact. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • There is sufficient sea room around the Morgan Generation Assets and Transmission Assets for these vessels to navigate. The sensitivity is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Generation Assets are located clear of major shipping routes and therefore the cumulative effect is not anticipated to be materially different to that described in Scenario 1. The sensitivity is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers the following: • Given that the presence of Scenario 3 projects does not prevent access into Liverpool through the TSS, it is considered that the requirements of safeguarding sea lanes essential to international navigation would not be breached. The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to materially impact recognised sea lanes.	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 2 cumulative projects are not anticipated to materially impact recognised sea lanes.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the operations and maintenance phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of construction buoyage or structures • The cumulative impact on vessel routeing will, therefore, be the same, albeit for different durations. The magnitude is therefore, considered to be **negligible**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **negligible**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms A negligible rather than minor effect has been determined given that the Scenario 1 cumulative	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms A negligible rather than minor effect has been determined given that the Scenario 2 cumulative	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	projects are not anticipated to materially impact recognised sea lanes.	projects are not anticipated to materially impact recognised sea lanes.	
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the decommissioning phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of construction buoyage or structures. The magnitude is therefore, considered to be **negligible**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **negligible**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to materially impact recognised sea lanes.	Overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 2 cumulative projects are not anticipated to materially impact recognised sea lanes.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Further mitigation and residual significance	None	None	None

7.11.3 Impact to commercial operators including strategic routes and lifeline ferries

7.11.3.1 Table 7.31 provides a summary of the impact of the Morgan Generation Assets, in combination with other Tier 1 and Tier 2 cumulative projects on commercial operators including strategic routes and lifeline ferries. Further detail for the Scenario 3 cumulative assessment, including relevant figures, is provided in Appendix A.

Table 7.31: Impact to commercial operators including strategic routes and lifeline ferries.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Vessels would be deviated around the Morgan Generation Assets and Transmission Assets during construction • The Transmission Assets consists of a single isolated structure and a temporary and localised cable installation impact which would have a negligible impact on ship routeing • The impact of the Morgan Generation Assets is not anticipated to be materially different to that in isolation and described in section 7.9.3 • There is sufficient sea room around the Morgan Generation Assets and Transmission Assets for these vessels to navigate. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **medium**.	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Array Area intersects the route taken by Stena Line between Liverpool and Belfast when passing east of the Isle of Man, this is less used at 350 movements per year than the westabout route of 1,500 movements per year • These vessels would require a minor increase in transit time when passing west of Morecambe and east of Morgan of between 13 and 16 minutes depending on which route either side of the Morecambe gas fields had been taken • The Morecambe Generation Assets are located clear of all other major shipping routes and therefore the cumulative effect is not anticipated to be materially different to that described in Scenario 1. The magnitude of impact to the IoMSPC is therefore, considered to be **high**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers construction or operation of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Generation Assets, and Mooir Vannin Offshore Wind Farm: • Tier 1 and Tier 2 projects (not including Mooir Vannin Offshore Wind Farm) would impact six regular ferry service routes across IoMSPC, Stena Line and Seatruck increasing the transit duration of each movement: – IoMSPC: Douglas to Liverpool: an additional 0.5 minutes – IoMSPC: Douglas to Heysham: an additional 1.6 minutes – Stena Line: Liverpool to Belfast (west Isle of Man): an additional 4.5 minutes – Stena Line: Liverpool to Belfast (east Isle of Man): an additional 13 to 16 minutes

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.	The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.	– Seatruck: Heysham to Warrenpoint: an additional 4.3 minutes – Seatruck: Heysham to Dublin: an additional 0.3 minutes • Minor cargo/tanker routes with less than one vessel a week are impacted with some increase in transit distance. With the addition of the Mooir Vannin Offshore Wind Farm (based on the array area presented within the Mooir Vannin Offshore Wind Farm Scoping report): • The IoMSPC Heysham to Douglas route would be further constrained when passing between Morgan Array Area and the Mooir Vannin Offshore Wind Farm, due to the narrow width which may cause congestion and a reduction in speed • The Stena Line route between Liverpool and Belfast (east of the Isle of Man) would require greater deviations of up to a further 20 minutes to pass around the offshore wind farms • The commercial route between Ramsey and Glasson used by the Silver River would require deviation, similar to that of the Mooir Vannin Offshore Wind Farm in isolation. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **high**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **high**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • There is sufficient sea room around the Morgan Generation Assets and Transmission Assets for these vessels to navigate • The impacts on schedule are not considered significant enough to cause substantial adverse impacts on operators schedules, but could will necessitate a minor increase in fuel cost, emissions and operating costs • These impacts are not anticipated to be materially different to that in isolation and described in section 7.9.3. The sensitivity of impact to the IoMSPC is therefore, considered to be **low**. The sensitivity of impact to Stena Line is therefore, considered to be **low**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **low** .	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Generation Assets are located clear of most major shipping routes and therefore the cumulative effect is not anticipated to be materially different to that described in Scenario 1 • The additional increase in transit duration for Stena Line on top of Scenario 1 is approximately ten minutes on an eight hour journey which is less than existing operational constraints • The impacts on schedule are not considered significant enough to cause substantial adverse impacts on operators schedules, but could will necessitate a minor increase in fuel cost, emissions and operating costs. The sensitivity of impact to the IoMSPC is therefore, considered to be **low**. The sensitivity of impact to Stena Line is therefore, considered to be **low**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 (not including Mooir Vannin Offshore Wind Farm) considers the following: • Given accumulation of impacts and delays of up to ten minutes across multiple operators and routes this impact is considered greater than it would be for Scenario 1 or Scenario 2 • The additional transit time would increase operational pressures on ferry operators to load, transit and disembark passengers and vehicles within the constraints of an established timetable • Furthermore, the greater meeting frequency between vessels may necessitate more frequent reductions in speed as part of collision avoidance actions. With the addition of the Mooir Vannin Offshore Wind Farm (based on the array area presented within the Mooir Vannin Offshore Wind Farm Scoping report): • The IoMSPC Heysham to Douglas route would have a further minor increase in delays • The Stena Line route between Liverpool and Belfast (east of the Isle of Man) would

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
		The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **low** .	unviable and therefore the existing benefits of this route would be lost • The commercial route between Ramsey and Glasson used by the Silver River may face increased operational challenges due to the large rerouted distance. The sensitivity of impact to the IoMSPC is therefore, considered to be **low**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.
Further mitigation and residual significance	None	None	Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			Vannin Offshore Wind Farm through the planning process.
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the operations and maintenance phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of construction buoyage or structures • The cumulative impact on vessel routeing will, therefore, be the same, albeit for different durations. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **high**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **high**.
Sensitivity of receptor	The sensitivity of impact to the IoMSPC is therefore, considered to be **low**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **low**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The sensitivity of impact to Stena Line is therefore, considered to be **low**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **low** .	The sensitivity of impact to Stena Line is therefore, considered to be **low**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **low** .	The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.
Further mitigation and residual significance	None	None	Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **high**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **high**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	• During both the construction and the decommissioning phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of construction buoyage or structures. The magnitude of impact to the IoMSPC is therefore, considered to be **high**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.	The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.	The magnitude of impact to Stena Line is therefore, considered to be **high**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **high**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **high**.
Sensitivity of receptor	The sensitivity of impact to the IoMSPC is considered to be **low**. The sensitivity of impact to Stena Line is considered to be **low**. The sensitivity of impact to Seatruck Ferries is considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is considered to be **low**.	The sensitivity of impact to the IoMSPC is considered to be **low**. The sensitivity of impact to Stena Line is considered to be **low**. The sensitivity of impact to Seatruck Ferries is considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is considered to be **low**.	The sensitivity of impact to the IoMSPC is considered to be **low**. The sensitivity of impact to Stena Line is considered to be **medium**. The sensitivity of impact to Seatruck Ferries is considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are	The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules. The cumulative effect to commercial cargo/tanker operators will be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.
Further mitigation and residual significance	None	None	Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

7.11.4 Impact on adverse weather routeing

7.11.4.1 Table 7.32 provides a summary of the impact of the Morgan Generation Assets, in combination with other Tier 1 and Tier 2 cumulative projects on adverse weather routeing. Further detail for the Scenario 3 cumulative assessment, including relevant figures, is provided in Appendix A.

Table 7.32: Impact on adverse weather routeing.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • During adverse weather, vessels would be deviated around the Morgan Generation Assets and Transmission Assets during construction as described in section 7.9.4 • The Transmission Assets consists of a single isolated structure which is clear of key adverse weather routes. Construction activities associated with the Transmission Assets are temporary, localised and unlikely to occur during adverse weather • The impact of the Morgan Generation Assets is not anticipated to be materially different to that in isolation and described in section 7.9.4, namely to the IoMSPC route between Heysham and Douglas, Stena Line route between Liverpool and Belfast, and Stena Line route between Heysham and Belfast. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**.	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Array Area is clear of the majority of adverse weather routes taken by regular runners • Therefore, the cumulative impacts of Scenario 2 is not anticipated to be materially different to that described in Scenario 1. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers construction or operation of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Generation Assets, and Mooir Vannin Offshore Wind Farm: • Tier 1 and Tier 2 projects (not including Mooir Vannin Offshore Wind Farm) would impact five regular ferry service routes across IoMSPC, Stena Line and Seatruck: – IoMSPC: Douglas to Liverpool: is constrained in conditions between 2.0 m and 2.5 m Hs, taking adverse routes on approximately 30 of 600 transits – IoMSPC: Douglas to Heysham: is constrained in conditions between 2.5 m and 3.0 m Hs, taking adverse routes on approximately 20 of 1,300 transits

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.		– Stena Line: Liverpool to Belfast: is constrained in conditions above 3.0 m Hs, taking adverse routes on approximately 20 of 1,500 transits – Stena Line: Heysham to Belfast: is constrained in conditions above 3.0 m Hs, taking adverse routes on approximately 50 of 1,100 transits – Seatruck adverse weather routes are typically located further west than Tier 1 and Tier 2 projects and therefore impacts are similar to those described in typical conditions • There was a negligible impact on cargo/tanker adverse weather routes. With the addition of the Mooir Vannin Offshore Wind Farm (based on the array area presented within the Mooir Vannin Offshore Wind Farm Scoping report): • The IoMSPC route between Heysham and Douglas would have less sea room and therefore the frequency of adverse weather routes are taken would be greater • The Stena Line routes between Heysham and Belfast and Liverpool Belfast east of the Isle of Man would require multiple course changes and constrained passages which would not be realistic in adverse weather • Commercial cargo/tanker adverse weather routes are infrequent but would be further

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			constrained when passing east of the Isle of Man. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • The adverse weather routes for Scenario 1 would be identical as those described in section 7.9.3 • These could increase the number of delays and cancellations of lifeline ferry services and strategic routes due to deviation around the Morgan Array Area. The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	Given that the Morecambe Array Area is clear of adverse weather routes, the sensitivity of Scenario 2 is not anticipated to be materially different to Scenario 1. The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers the following: • Tier 1 and Tier 2 projects (not including Mooir Vannin Offshore Wind Farm) would impact five regular ferry service routes across IoMSPC, Stena Line and Seatruck: – IoMSPC: Douglas to Liverpool: existing delays of between 10 to 33 minutes would increase by a further 13 minutes – IoMSPC: Douglas to Heysham: existing delays of between 10 to 23 minutes would increase by a further 24 minutes – Stena Line: Liverpool to Belfast: existing delays of between 15 and 20 minutes would be unaffected by the Tier 1 and Tier 2 projects

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			– Stena Line: Heysham to Belfast: existing delays of between 40 to 70 minutes would increase by a further 63 minutes – Seatruck adverse weather routes are typically located further west than Tier 1 and Tier 2 projects and therefore impacts are similar to those described in typical conditions • The additional transit duration and deviations are likely to result in increased delays and cancellations to these services • There was a negligible impact on cargo/tanker adverse weather routes. With the addition of the Mooir Vannin Offshore Wind Farm (based on the array area presented within the Mooir Vannin Offshore Wind Farm Scoping report): • The IoMSPC route between Heysham and Douglas would have more frequent delays and cancellations • The Stena Line routes between Heysham and Belfast and Liverpool Belfast east of the Isle of Man would be more frequently delayed as they route west of the Isle of Man and could be cancelled more frequently. The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the operations and maintenance phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of construction buoyage or structures • The cumulative impact on vessel routeing will, therefore, be the same, albeit for different durations. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.		
Sensitivity of receptor	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.		The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the decommissioning phases of the cumulative projects, large commercial ships will not be able to transit through the array areas,	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	whether through the presence of construction buoyage or structures. The magnitude of impact to the IoMSPC is therefore, considered to be **medium**. The magnitude of impact to Stena Line is therefore, considered to be **medium**. The magnitude of impact to Seatruck Ferries is therefore, considered to be **low**. The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.	The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.	The magnitude of impact to commercial cargo/tanker operators is therefore, considered to be **low**.
Sensitivity of receptor	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **negligible**.	The sensitivity of impact to the IoMSPC is therefore, considered to be **medium**. The sensitivity of impact to Stena Line is therefore, considered to be **medium**. The sensitivity of impact to Seatruck Ferries is therefore, considered to be **low**. The sensitivity of impact to commercial cargo/tanker operators is therefore, considered to be **medium**.
Significance of effect	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than	The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The cumulative effect to the IoMSPC will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Stena Line will be of **moderate adverse significance**, which is significant in EIA terms. The cumulative effect to Seatruck Ferries will be of **minor adverse significance**, which is not

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.	The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.	significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted. The cumulative effect to commercial cargo/tanker operators will be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.	Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Despite this, the assessment has concluded that a significant effect remains. The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination process.

7.11.5 Impact on access to ports and harbours

Table 7.33: Impact on access to ports and harbours.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The Morgan Generation Assets and surface piercing structures as part of the Transmission Assets are outside of any Statutory or Competent Harbour Authority Area • Whilst there would be an impact on vessel routeing due to Scenario 1 cumulative projects, it is not considered to adversely effect the viability of those ports and harbours • There Scenario 1 cumulative projects could result in additional movements into ports and harbours which could result in congestion and additional risks to the ports/harbours • This has been successfully managed at other ports/harbours in the UK. The magnitude is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Generation Assets are located clear of major shipping routes and therefore the cumulative effect is not anticipated to be materially different to that described in Scenario 1. The magnitude is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 1 considers the following: • The Scenario 3 cumulative projects are outside of any Statutory or Competent Harbour Authority Area • Whilst there would be an impact on vessel routeing due to Scenario 3 cumulative projects, it is not considered to adversely effect the viability of those ports and harbours • There Scenario 3 cumulative projects could result in additional movements into ports and harbours which could result in congestion and additional risks to the ports/harbours. This would be substantially greater than for Scenarios 1 and 2 • This has been successfully managed at other ports/harbours in the UK but the magnitude is considered higher than Scenario 1 given the extent of cumulative projects. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers that any cumulative	The cumulative effects assessment for Scenario 2 considers that any cumulative	**Tier 1, 2 and 3**

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	effects are temporary and can be managed by the ports and harbours themselves. The sensitivity is therefore, considered to be **low**.	effects are temporary and can be managed by the ports and harbours themselves. The sensitivity is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 3 considers that any cumulative effects are temporary and can be managed by the ports and harbours themselves. The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to adversely impact port/harbour operations.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 2 cumulative projects are not anticipated to adversely impact port/harbour operations.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • Whilst the numbers of vessel movements during operations and maintenance are less than during construction, it will occur for a longer duration.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The magnitude is therefore, considered to be **low**.		
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to adversely impact port/harbour operations.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to adversely impact port/harbour operations.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • During both the construction and the decommissioning phases there will be an increase in project vessel movements to support construction and decommissioning activities.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	The magnitude is therefore, considered to be **low**.		
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to adversely impact port/harbour operations.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **negligible adverse significance**, which is not significant in EIA terms. A negligible rather than minor effect has been determined given that the Scenario 1 cumulative projects are not anticipated to adversely impact port/harbour operations.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None

7.11.6 Impact on emergency response capability due to increased incident rates and reduced access for SAR responders

Table 7.34: Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Relatively few incidents have occurred in the shipping and navigation study area • There are several established committed risk controls to manage this impact • Turbine spacing and commitments to two lines of orientation exceed SAR guidance • Emergencies on board can be responded to with minimal adverse effect as a result of the Scenario 1 cumulative projects. The magnitude is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers that all Scenario 2 cumulative projects would follow similar risk control measures and the impacts between them would be similar as to those described in Scenario 1. The magnitude is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that all Scenario 3 cumulative projects would follow similar risk control measures and the impacts between them would be similar as to those described in Scenario 1. The magnitude is therefore, considered to be **low**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers that whilst SAR capability could be adversely impacted, compliance with guidance and best practice would mitigate this. The sensitivity is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers that whilst SAR capability could be adversely impacted, compliance with guidance and best practice would mitigate this. The sensitivity is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that whilst SAR capability could be adversely impacted, compliance with guidance and best practice would mitigate this. The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the	**Tier 1, 2 and 3**

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • Whilst the numbers of vessel movements during operations and maintenance are less than during construction, it will occur for a longer duration • The primary risk controls in place during operations and maintenance will be similar to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the presence of the structures will have an adverse impact on SAR capability as opposed to open sea.
Further mitigation and residual significance	None	None	None

7.11.7 Impact on vessel to vessel collision risk

7.11.7.1 Table 7.35 provides a summary of the impact of the Morgan Generation Assets, in combination with other Tier 1 and Tier 2 cumulative projects on vessel to vessel collision risk. Further detail for the Scenario 3 cumulative assessment, including relevant figures, is provided in Appendix A.

Table 7.35: Impact on vessel to vessel collision risk.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Vessels would be deviated around the Morgan Generation Assets and Transmission Assets during construction • The Transmission Assets consists of a single isolated structure and a temporary and localised cable installation impact which would have a minor impact on collision likelihood due to its localised and short duration of effect • The impact of the Morgan Generation Assets is not anticipated to be materially different to that in isolation and described in section 7.9.7. This includes the increased encounters between vessels, emerging traffic from the Morgan Array Area and impact on small craft that is likely to increase the likelihood of collision	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Array Area is located in an area presently occupied by oil and gas facilities and there is more than 9 nm between the Morecambe and Morgan Array Areas, therefore, there will be a negligible impact on ship routeing • An increase in small craft interactions between oil and gas and construction vessels would be anticipated • The impact of Scenario 2 cumulative projects is not anticipated to be materially different to that of Scenario 1. The magnitude is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers the following: • The presence of Scenario 3 cumulative projects will result in vessels deviating into routes between the array areas which could increase the likelihood of collision • All routes between Scenario 3 projects meet the relevant guidance with regards to safe navigable widths • Analysis of predicted meeting frequency between commercial vessels was shown to be low • Full bridge simulations found that masters could take appropriate action in complex, realistic traffic situations whilst maintaining the desired CPA • The addition of the Scoping Boundary of Mooir Vannin was of insufficient width for safe navigation and would cause an unacceptably high likelihood of collision, particularly

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	• However, that increase was concluded to be manageable through existing operational controls. The magnitude is therefore, considered to be **low**.		between commercial ferries and small craft such as fishing vessels. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity and consequences of collision as a result of Scenario 1 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.7. Given the realistic worst credible potential loss of life in collisions, the sensitivity is therefore, considered to be **high**.	The sensitivity and consequences of collision as a result of Scenario 2 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.7. Given the realistic worst credible potential loss of life in collisions, the sensitivity is therefore, considered to be **high**.	**Tier 1, 2 and 3** The sensitivity and consequences of collision as a result of Scenario 3 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.7. Given the realistic worst credible potential loss of life in collisions, the sensitivity is therefore, considered to be **high**.
Significance of effect	The NRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement) concluded that all collision hazards were either Broadly Acceptable ALARP. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Whilst the combination of Scenario 2 was not assessed as part of the NRA or CRNRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement), given the arrangement of infrastructure it is anticipated that the risk scores would be similar as described for Scenario 1. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) concluded that whilst all hazards were Medium Risk – Tolerable if ALARP or lower with the Mona, Morgan and Morecambe Array Areas, the addition of Mooir Vannin would result in High Risk – Unacceptable hazards. Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse significance**, which is significant in EIA terms.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Array Area and the Scoping Boundary of Mooir Vannin.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	substantially different to those during construction • The impacts on vessel routeing would be similar as those during construction as most vessels would avoid the array areas • Whilst the numbers of vessel movements during operations and maintenance are less than during construction, it will occur for a longer duration • The primary risk controls in place during operations and maintenance will be similar to those during construction. The magnitude is therefore, considered to be **low**.	The magnitude is therefore, considered to be **low**.	The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **high**.	The sensitivity is therefore, considered to be **high**.	The sensitivity is therefore, considered to be **high**.
Significance of effect	The NRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement) concluded that all collision hazards were either Broadly Acceptable or ALARP. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Whilst the combination of Scenario 2 was not assessed as part of the NRA or CRNRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement), given the arrangement of infrastructure it is anticipated that the risk scores would be similar as described for Scenario 1. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) concluded that whilst all hazards were Medium Risk – Tolerable if ALARP or lower with the Mona, Morgan and Morecambe Array Areas, the addition of Mooir Vannin would result in High Risk – Unacceptable hazards. Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			moderate adverse significance, which is significant in EIA terms. A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Array Area and the Scoping Boundary of Mooir Vannin.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following:	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	• The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **low**.	are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **high**.	The sensitivity is therefore, considered to be **high**.	The sensitivity is therefore, considered to be **high**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse significance**, which is significant in EIA terms. A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Array Area and the Scoping Boundary of Mooir Vannin.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

7.11.8 Impact on allision (contact) risk to vessels

7.11.8.1 Table 7.36 provides a summary of the impact of the Morgan Generation Assets, in combination with other Tier 1 and Tier 2 cumulative projects on allision (contact) risk. Further detail for the Scenario 3 cumulative assessment, including relevant figures, is provided in Appendix A.

Table 7.36: Impact on allision (contact) risk to vessels.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Vessels would be deviated around the Morgan Generation Assets and Transmission Assets during construction • The Transmission Assets consists of a single isolated structure which is offset from main shipping routes • The impact of the Morgan Generation Assets is not anticipated to be materially different to that in isolation and described in section 7.9.8. The likelihood of allision was modelled and assessed through full bridge simulations and concluded to be low and manageable through existing operational controls. The magnitude is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers the following: • The Morecambe Array Area is located in an area presently occupied by oil and gas facilities and there is more than 9 nm between the Morecambe and Morgan Array Areas, therefore, there will be a negligible impact on ship routeing • An increase in small craft interactions between oil and gas and construction vessels with the Scenario 2 structures would be anticipated • However, the impact of Scenario 2 cumulative projects is not anticipated to be materially different to that of Scenario 1. The magnitude is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers the following: • The presence of Scenario 3 cumulative projects will result in vessels deviating into routes between the array areas which could increase the likelihood of allision given the reduced sea room • All routes between Scenario 3 projects meet the relevant guidance with regards to safe navigable widths • Navigating during adverse weather or in busy traffic situations could bring an increased risk of allision • Full bridge simulations found that masters could take appropriate action in complex, realistic traffic situations whilst maintaining the desired CPA

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			• Other hazards such as emerging vessels from Scenario 3 cumulative projects are as described in section 7.9.8 • The addition of the Scoping Boundary of Mooir Vannin was of insufficient width for safe navigation and would cause an unacceptably high likelihood of allision for vessels navigating the route between the Morgan Array Area, Walney offshore wind farms and Scoping Boundary of Mooir Vannin. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity and consequences of allision as a result of Scenario 1 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.8. Given the realistic worst credible potential loss of life in allisions albeit lower most likely outcome, the sensitivity is therefore, considered to be **medium**.	The sensitivity and consequences of allision as a result of Scenario 2 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.8. Given the realistic worst credible potential loss of life in allisions albeit lower most likely outcome, the sensitivity is therefore, considered to be **medium**.	**Tier 1, 2 and 3** The sensitivity and consequences of allision as a result of Scenario 3 cumulative projects would not be substantially different to those of the Morgan Generation Assets individual assessment described in section 7.9.8. Given the realistic worst credible potential loss of life in allisions albeit lower most likely outcome, the sensitivity is therefore, considered to be **medium**.
Significance of effect	The NRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement) concluded that all allision hazards were either Broadly Acceptable or ALARP. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor**	Whilst the combination of Scenario 2 was not assessed as part of the NRA or CRNRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement), given the arrangement of infrastructure it is anticipated that the risk scores would be similar as described for Scenario 1.	**Tier 1, 2 and 3** The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) concluded that whilst all hazards were Medium Risk – Tolerable if ALARP or lower with the Mona, Morgan and Morecambe Array Areas, the addition of Mooir Vannin would result in High Risk – Unacceptable hazards.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	adverse significance, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse significance**, which is significant in EIA terms.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	substantially different to those during construction • During operations and maintenance, structures will be fully commissioned and more visible to passing vessels • The impacts on vessel routeing would be similar as those during construction as most vessels would avoid the array areas • There is likely to be greater small craft (recreational and fishing) activity within the Morgan Array Area, however structures are spaced widely apart to facilitate this • Whilst the numbers of vessel movements during operations and maintenance are less than during construction, it will occur for a longer duration • The primary risk controls in place during operations and maintenance will be similar to those during construction. The magnitude is therefore, considered to be **low**.	substantially different to those during construction. The magnitude is therefore, considered to be **low**.	The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **medium**.	The sensitivity is therefore, considered to be **medium**.	The sensitivity is therefore, considered to be **medium**.
Significance of effect	The NRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement) concluded that all allision hazards were either Broadly Acceptable or ALARP. Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The	Whilst the combination of Scenario 2 was not assessed as part of the NRA or CRNRA (Volume 4, Annex 7.1 Navigational Risk Assessment of the Environmental Statement), given the arrangement of infrastructure it is anticipated that the risk scores would be similar as described for Scenario 1.	**Tier 1, 2 and 3** The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) concluded that whilst all hazards were Medium Risk – Tolerable if ALARP or lower with the Mona, Morgan and Morecambe Array

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Areas, the addition of Mooir Vannin would result in High Risk – Unacceptable hazards. Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse significance**, which is significant in EIA terms.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following:	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	• The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **low**.	are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **medium**.	The sensitivity is therefore, considered to be **medium**.	The sensitivity is therefore, considered to be **medium**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse significance**, which is significant in EIA terms.
Further mitigation and residual significance	None	None	Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact. No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
			Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

7.11.9 Impact on marine navigation, communications and position fixing equipment

Table 7.37: Impact on marine navigation, communications and position fixing equipment.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Previous studies have demonstrated that there is no discernible impact on VHF, AIS, GNSS or compasses used by vessels passing an offshore wind farm • Some effects on radar can be experienced when passing near to offshore wind farms • Several ferry routes pass adjacent to Scenario 1 cumulative projects and it is credible they would experience these effects. The magnitude is therefore, considered to be **medium**.	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be effected. The magnitude is therefore, considered to be **medium**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be effected. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • Interference could reduce the effectiveness of collision detection and could increase the risk of an accident • These effects are greatest within 0.5 nm of an offshore wind farm, closer than most commercial vessels would navigate • Most operators in the Irish Sea would routinely experience these effects from existing offshore wind farms and therefore	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be affected. The sensitivity is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be affected. The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	would be experienced at mitigating their effects. The sensitivity is therefore, considered to be **low**.		
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • The presence of infrastructure will have a similar effect on shipboard equipment • The primary risk controls in place during operations and maintenance will be similar to those during construction. The magnitude is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor**	Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor**	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor**

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	adverse significance, which is not significant in EIA terms.	**adverse significance**, which is not significant in EIA terms.	**adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None

7.11.10 Impact on recreational craft passages and safety

Table 7.38: Impact on recreational craft passages and safety.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Analysis of vessel traffic demonstrates that there are few recreational vessels in the shipping and navigation study area • Most cruising routes are inshore and away from the Scenario 1 cumulative projects • Some infrequently used cruising routes cross the shipping and navigation study area between the Isle of Man, Wales and English coasts. The magnitude is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be affected. The magnitude is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that these effects would be similar as described in Scenario 1, however, the wide extent of Scenario 3 cumulative projects would have a greater impact on multiple cruising routes. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • During construction, recreational craft would not be able to transit through the construction areas of Scenario 1 cumulative projects • The deviation necessary to avoid these areas is minimal, given the routes taken by these vessels. The sensitivity is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be affected. The sensitivity is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that these effects would be similar as described in Scenario 1, albeit that more routes might be affected. The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 1 cumulative projects will disrupt offshore cruising routes.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 2 cumulative projects will disrupt offshore cruising routes.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • However, the lack of restrictions, spacing between turbines and commitments to two lines of orientation would enable some recreational vessels to navigate through the array areas, reducing disruption. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 1 cumulative projects will disrupt offshore cruising routes.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 2 cumulative projects will disrupt offshore cruising routes.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor**	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor**	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	adverse significance, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 1 cumulative projects will disrupt offshore cruising routes.	**adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given that the Scenario 2 cumulative projects will disrupt offshore cruising routes.	cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None

7.11.11 Impact on snagging risk to vessel anchors and fishing gear

Table 7.39: Impact on snagging risk to vessel anchors and fishing gear.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Construction			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • Subsea cables are both at risk of anchor or fishing gear strikes and can pose a hazard to navigating vessels. During construction, there may be times when the cables are	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1, however, there will be significantly more subsea cables in the east Irish Sea. This necessarily increases the likelihood of such an occurrence.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	unburied/unprotected and other vessels are unaware of their presence • There are no commercial ship or small craft anchorages in the proximity to Scenario 1 cumulative projects • There is significant fishing activity near to Scenario 1 cumulative projects • Cable burial and other risk controls would reduce the magnitude of this impact. The magnitude is therefore, considered to be **low**.	The magnitude is therefore, considered to be **low**.	The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The cumulative effects assessment for Scenario 1 considers the following: • The snagging of fishing gear is likely to lead to damage but could in the worst case result in capsize and fatalities • The snagging of commercial anchors is unlikely to cause damage to the vessel. The sensitivity is therefore, considered to be **low**.	The cumulative effects assessment for Scenario 2 considers that these effects would be similar as described in Scenario 1. The sensitivity is therefore, considered to be **low**.	**Tier 1, 2 and 3** The cumulative effects assessment for Scenario 3 considers that these effects would be similar as described in Scenario 1. The sensitivity is therefore, considered to be **low**.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
	A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	
Further mitigation and residual significance	None	None	None
Operations and maintenance			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction • However, the lack of restrictions, spacing between turbines and commitments to two lines of orientation would likely increase the fishing activity and therefore likelihood of cable strikes • Conversely, cables will be fully buried or protected and local fishermen will be more aware of their location. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during operations and maintenance of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None
Decommissioning			
Magnitude of impact	The cumulative effects assessment for Scenario 1 considers the following: • The cumulative effects assessment for Scenario 1 are not anticipated to be substantially different to those during construction, with similar risk controls in place. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 2 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **low**.	As described in Scenario 1, the cumulative effects during decommissioning of Scenario 3 are not anticipated to be substantially different to those during construction. The magnitude is therefore, considered to be **medium**.
Sensitivity of receptor	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.	The sensitivity is therefore, considered to be **low**.

	Scenario 1 Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Scenario 2: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 3: Morgan Generation Assets + Morgan and Morecambe Offshore Wind Farms: Transmission Assets + Tier 1, Tier 2, Tier 3 projects
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms. A minor rather than negligible effect has been determined given the high density of fishing activity in the east Irish Sea.	**Tier 1, 2 and 3** Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.
Further mitigation and residual significance	None	None	None

7.11.12 Future monitoring

7.11.12.1 Table 7.40 below outlines the proposed monitoring commitments for shipping and navigation to address cumulative effects. These monitoring commitments are accepted, industry standard methods by which the cumulative impacts to shipping and navigation can be monitored and ensure the predictions of the NRA are consistent with the realised impacts and therefore that the risk control options are appropriate.

Table 7.40: Monitoring commitments.

Environmental effect	Monitoring commitment	Means of implementation
All impacts on vessel routeing and safety	Preparation and adherence to a navigation monitoring strategy for construction and post-construction monitoring of marine traffic (by AIS) with a report submitted annually to MMO, MCA and Trinity House. The report will assess the extent to which the impacts predicted in the NRA are accurate to ensure adopted risk controls are fit for purpose. An Offshore In-principle Monitoring Plan will set out the navigation monitoring strategy, including vessel traffic monitoring by AIS. An outline of the plan has been submitted with the Application, Document Reference J12	Navigation Monitoring Strategy secured within the deemed marine licences within the draft DCO.
Impact on allision (contact) risk to vessels	Preparation and adherence to an ANMP which includes AtoN monitoring to ensure constant functionality through the lifetime of the Morgan Generation Assets. Trinity House to be informed of any defects. An ATNP will be finalised and approved in consultation with MCA and Trinity House.	ANMP is secured within the deemed marine licences within the draft DCO.
Impact on snagging risk to vessel anchors and fishing gear	Preparation and adherence to an Offshore CMS which includes details of cable monitoring of cable burial and protection status to ensure specified requirements are met.	Offshore CMS with details of cable monitoring secured within the deemed marine licences within the draft DCO.

7.12 Transboundary effects

7.12.1.1 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from the Morgan Generation Assets upon the interests of other states has been assessed as part of the Environmental Statement. Each individual vessel may be internationally owned or operating between ports in different states. These impacts have been captured and assessed within this shipping and navigation chapter, NRA and CRNRA. No additional transboundary impacts are therefore anticipated.

7.13 Inter-related effects

7.13.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Morgan Generation Assets (construction, operations and maintenance, and decommissioning), to interact to potentially create a more

significant effect on a receptor than if just assessed in isolation in these three phases (e.g. subsea noise effects from piling, operational turbines, vessels and decommissioning)

- Receptor-led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on shipping and navigation may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

7.13.1.2 A description of the likely inter-related effects arising from the Morgan Generation Assets on shipping and navigation is provided in Volume 2, Chapter 15: Inter-related effects of the Environmental Statement.

7.14 Summary of impacts, mitigation measures and monitoring

7.14.1.1 Information on shipping and navigation within the shipping and navigation study area was collected through consultation with stakeholders, analysis of historical vessel traffic and incident data, hazard workshops and full bridge simulations.

- Table 7.41 presents a summary of the potential impacts, measures adopted as part of the project and residual effects in respect to shipping and navigation. The impacts assessed include, impacts to vessel routeing, impacts to port operations, impacts to navigational safety and impacts to emergency response
- Overall it is concluded that there will be the following significant effects arising from the Morgan Generation Assets during the construction, operations/ maintenance or decommissioning phases:
  - Impact on adverse weather routeing
- Table 7.42 presents a summary of the potential cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include, impacts to vessel routeing, impacts to port operations, impacts to navigational safety and impacts to emergency response. Overall, it is concluded that there will be the following significant cumulative effects from the Morgan Generation Assets alongside other projects/plans:
  - Impact to commercial operators including strategic routes and lifeline ferries
  - Impact on adverse weather routeing
  - Impacts on vessel to vessel collision risk
  - Impact on allision (contact) risk to vessels
- No additional potential transboundary impacts have been identified in regard to effects of the Morgan Generation Assets.

Table 7.41: Summary of potential environmental effects, mitigation and monitoring.

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	C: Negligible O: Negligible D: Negligible	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: High O: High D: High Stena Line C: Medium O: Medium D: Medium Seatruck C: High O: High D: High Cargo/tanker C: Medium O: Medium D: Medium	IoMSPC C: Low O: Low D: Low Stena Line C: Low O: Low D: Low Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor		IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to adverse weather routeing.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Negligible O: Negligible D: Negligible	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Continued engagement.	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on access to ports and harbours.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	ERCoP/ exercises Line of orientation Wind turbine and OSP spacing Design plan (including layout) Buoyed construction area	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on vessel to vessel collision risk.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Safety zone. Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises. Two lines of orientation Wind turbine and OSP spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: High O: High D: High	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on allision (contact) risk to vessels.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Air draught clearance Safety zone Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation Wind turbine and OSP spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: Medium O: Medium D: Medium	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	Two lines of orientation Wind turbine and OSP spacing Buoyed construction area.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on recreational craft passages and safety.	✓	✓	✓	Promulgation (including Notice to Mariners) Air draught clearance Two lines of orientation Wind turbine and OSP spacing Vessel traffic management plan.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓	✓	Promulgation (including Notice to Mariners) Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Cable burial risk assessment and CSIP.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Periodic validation surveys of cables.

Table 7.42: Summary of potential cumulative environmental effects, mitigation and monitoring.

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Scenario 1										
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	C: Negligible O: Negligible D: Negligible	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: High O: High D: High Stena Line C: Medium O: Medium D: Medium Seatruck C: High O: High D: High Cargo/tanker C: Medium O: Medium D: Medium	IoMSPC C: Low O: Low D: Low Stena Line C: Low O: Low D: Low Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor		IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to adverse weather routeing.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Negligible O: Negligible D: Negligible	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Continued engagement.	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on access to ports and harbours.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement. Cable burial risk assessment and CSIP Vessel traffic management plan.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	ERCoP/Marine Pollution Plan/exercises Two lines of orientation. Wind turbine and OSP spacing Design plan (including layout) Buoyed construction area.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on vessel to vessel collision risk.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation. Wind turbine and OSP spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: High O: High D: High	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on allision (contact) risk to vessels.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Air draught clearance Safety zone Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation. Wind turbine and OSP spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: Medium O: Medium D: Medium	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	Two lines of orientation Wind turbine and OSP spacing Buoyed construction area	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Impact on recreational craft passages and safety.	✓	✓	✓	Promulgation (including Notice to Mariners) Air draught clearance Two lines of orientation Wind turbine spacing Vessel traffic management plan.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓	✓	Promulgation (including Notice to Mariners) Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Cable burial risk assessment and CSIP.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Periodic validation surveys of cables.
Scenario 2										
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	C: Negligible O: Negligible D: Negligible	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: High O: High D: High Stena Line C: Medium O: Medium D: Medium Seatruck C: High O: High D: High Cargo/tanker C: Medium O: Medium D: Medium	IoMSPC C: Low O: Low D: Low Stena Line C: Low O: Low D: Low Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor		IoMSPC C: Minor O: Minor D: Minor Stena Line C: Minor O: Minor D: Minor Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to adverse weather routeing.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Negligible O: Negligible D: Negligible	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Continued engagement.	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on access to ports and harbours.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Negligible O: Negligible D: Negligible		C: Negligible O: Negligible D: Negligible	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	ERCoP/Marine Pollution Plan/exercises Two lines of orientation Wind turbine spacing. Design plan (including layout). Buoyed construction area.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on vessel to vessel collision risk.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation Wind turbine spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: High O: High D: High	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on allision (contact) risk to vessels.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Air draught clearance Safety zone Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation Wind turbine spacing Construction method statement Vessel traffic management plan.	C: Low O: Low D: Low	C: Medium O: Medium D: Medium	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	Two lines of orientation Wind turbine spacing Buoyed construction area.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on recreational craft passages and safety.	✓	✓	✓	Promulgation (including Notice to Mariners) Air draught clearance Two lines of orientation Wind turbine spacing.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓	✓	Promulgation (including Notice to Mariners) Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Cable burial risk assessment and CSIP.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Periodic validation surveys of cables.
Scenario 3										
Tier 1, 2 and 3										
Impact on recognised sea lanes essential to international navigation.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to commercial operators including strategic routes and lifeline ferries.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: High O: High D: High Stena Line C: High O: High D: High Seatruck C: High O: High D: High Cargo/tanker C: High O: High D: High	IoMSPC C: Low O: Low D: Low Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Medium O: Medium D: Medium	IoMSPC C: Minor O: Minor D: Minor Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Moderate O: Moderate D: Moderate	Continued engagement.	IoMSPC C: Minor O: Minor D: Minor Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Moderate O: Moderate D: Moderate	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact to adverse weather routeing.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan.	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Low O: Low D: Low	IoMSPC C: Medium O: Medium D: Medium Stena Line C: Medium O: Medium D: Medium Seatruck C: Low O: Low D: Low Cargo/tanker C: Medium O: Medium D: Medium	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Continued engagement.	IoMSPC C: Moderate O: Moderate D: Moderate Stena Line C: Moderate O: Moderate D: Moderate Seatruck C: Minor O: Minor D: Minor Cargo/tanker C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on access to ports and harbours.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Construction method statement Vessel traffic management plan. Cable burial risk assessment and CSIP.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	ERCoP/Marine Pollution Plan/exercises Two lines of orientation Wind turbine spacing Design plan (including layout). Buoyed construction area.	C: Low O: Low D: Low	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on vessel to vessel collision risk.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Safety zone Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation Wind turbine spacing Construction method statement Vessel traffic management plan.	C: Medium O: Medium D: Medium	C: High O: High D: High	C: Moderate O: Moderate D: Moderate	Continued engagement.	C: Moderate O: Moderate D: Moderate	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on allision (contact) risk to vessels.	✓	✓	✓	Promulgation (including Notice to Mariners) Marking and charting Buoyed construction area Air draught clearance. Safety zone. Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Two lines of orientation Wind turbine spacing Construction method statement Vessel traffic management plan.	C: Medium O: Medium D: Medium	C: Medium O: Medium D: Medium	C: Moderate O: Moderate D: Moderate	Continued engagement.	C: Moderate O: Moderate D: Moderate	Construction/post-construction vessel traffic monitoring.
Impact on marine navigation, communications and position fixing equipment.	✓	✓	✓	Two lines of orientation Wind turbine spacing Buoyed construction area.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.
Impact on recreational craft passages and safety.	✓	✓	✓	Promulgation (including Notice to Mariners) Air draught clearance Two lines of orientation Wind turbine spacing.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Construction/post-construction vessel traffic monitoring.

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Impact on snagging risk to vessel anchors and fishing gear.	✓	✓		Promulgation (including Notice to Mariners) Safety zone. Guard vessels Offshore Environmental Management Plan, including Fisheries liaison coexistence plan and Marine Pollution Contingency Plan ERCoP/ exercises Construction Method Statement Cable burial risk assessment and CSIP.	C: Medium O: Medium D: Medium	C: Low O: Low D: Low	C: Minor O: Minor D: Minor		C: Minor O: Minor D: Minor	Periodic validation surveys of cables.
			✓							

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Appendix A: Cumulative effects assessment technical appendix

A.1 Impact to commercial operators including strategic routes and lifeline ferries

A.1.1 Scenario 3

A.1.1.1 Morgan Offshore Wind Project: Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and all other relevant projects

A.1.1.1.1 The assessment on shipping and navigation with Tier 1 projects, principally the Awel y Môr Offshore Wind Farm, did not result in levels of significance that were above those of the Morgan Generation Assets individual assessment, or when including the Transmission Assets. This is because there is a substantial spatial separation between the two offshore wind projects and few vessel routes are impacted by both projects. Therefore, the CEA for shipping and navigation has taken an approach to assessment which considers the cumulative effects with both Tier 1 and Tier 2 projects together.

Construction phase

A.1.1.1.2 The construction of the Morgan Generation Assets, cumulatively with the construction or operation of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Generation Assets, and Mooir Vannin Offshore Wind Farm has the potential for a cumulative impact to commercial operators including strategic routes and lifeline ferries (as described in NPS EN-3 Paragraph 2.8.328).

Magnitude of impact

A.1.1.1.3 During construction, vessel traffic would be displaced from the Morgan Array Area and Tier 1 and Tier 2 projects due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain a safe passing distance of at least 1 nm from navigational hazards.

A.1.1.1.4 The analysis of vessel routes in section 7.5 shows that several ferry and other commercial shipping routes would need to deviate around existing offshore wind farms, and the cumulative project's array areas (see Figure A.1 and Figure A.2 respectively). The revised passage plans were developed by the NASH project team, including master mariners, and account for existing decision-making principles that were obtained during consultation with operators and during the navigation simulation sessions (for example, passing at least 1.5 nm from a wind turbine). The revised passage plans do not consider the presence of the Mooir Vannin Offshore Wind Farm as the Scoping report had not been submitted at the time these were developed.

A.1.1.1.5 Each of these routes are potentially impacted by one or more array areas. Where vessel routes do not directly intersect the Morgan Array Area, but do intersect other Tier 1 and Tier 2 projects, they have been included within the cumulative assessment as there are cumulative impacts upon operators/ports with multiple routes.

Furthermore, the presence of all cumulative projects will indirectly affect the master decision making and passage planning.

A.1.1.1.6 The Liverpool to Dublin route previously operated by P&O ceased operation in December 2023 and therefore there are no impacts to P&O routes or operations.

A.1.1.1.7 It was noted during the navigation simulations and hazard workshop undertaken to inform the Environmental Statement that the changes made to the boundaries of the Mona, Morgan and Morecambe Potential Array Areas had reduced the impact to ferry routes by increasing the sea room between each development.

A.1.1.1.8 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the construction area
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

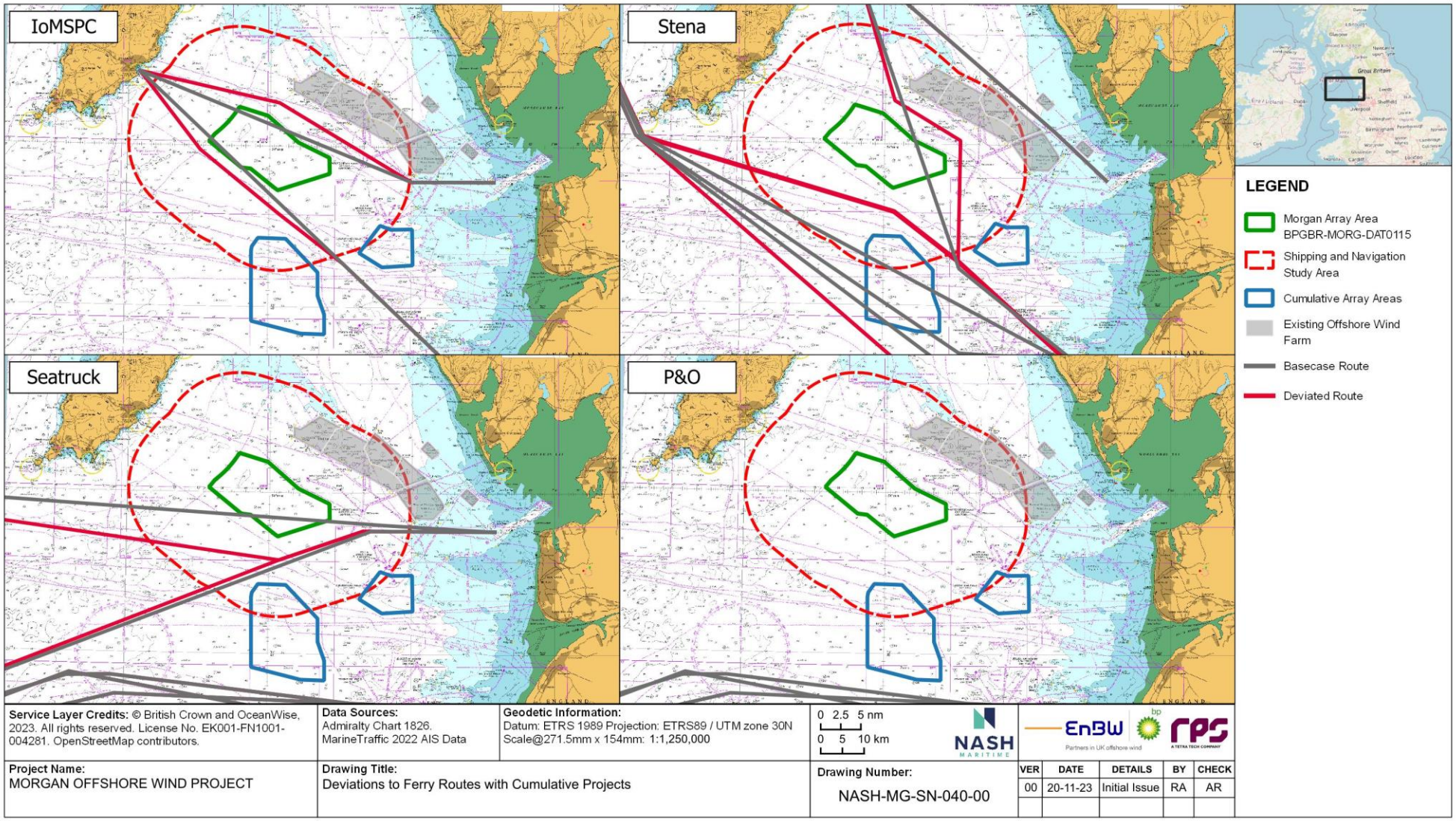

Figure A.1: Deviations to ferry routes with cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

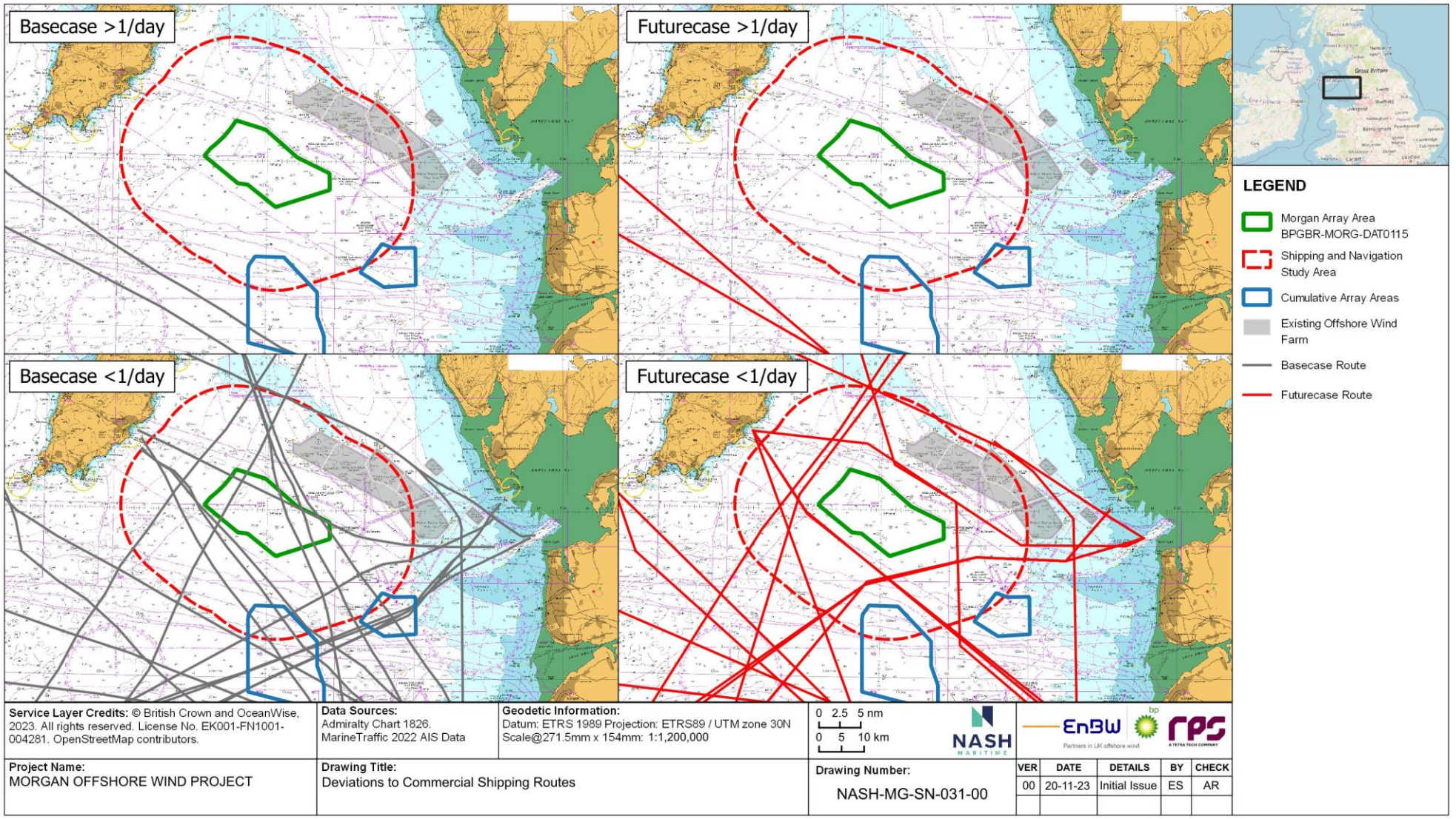

Figure A.2: Deviations to commercial shipping routes with cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

Table A.1: Impact on ferry routeing with Tier 1 and Tier 2 cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

Operators	Routes	Example Vessels	Approximate Annual Crossings (2022)	Baseline Distance (nm)	Baseline Time (Minutes)	Service Speed (Knots)	Project Distance (nm)	Additional Project Distance (nm)	Additional Project Time (Minutes)
IoMSPC	HEY – DOUG	Arrow	107	46.8	225	13.2	47.3	+0.5	+2.1
		Ben-My-Chree	1,275			17.2			+1.6
		Manannan	69			28.8			+1.0
	LIV – DOUG	Manannan	590	56.9	165	28.8	57.2	+0.3	+0.5
		Ben-My-Chree	3			17.2			+0.8
Stena	LIV – BEL W of IOM & No TSS	Stena Edda/Stena Embla/Stena Estrid/Stena Horizon/Stena Lagan/Stena Mersey/Stena Forecaster/Stena Forerunner/Stena Foreteller	1,098	113.3	480	18.7	114.7	+1.4	+4.5
	LIV – BEL W of IOM & East TSS		226	115.9			117.1	+1.2	+3.9
	LIV – BEL W of IOM & West TSS		166	115.2			117.3	+2.1	+6.8
	LIV – BEL E of IOM (E of Calder)		196	113.9			118.9	+5.0	+16.0
	LIV – BEL E of IOM (W of Calder)		194	114.9			118.9	+4.0	+12.7
	HEY – BEL (E of IOM)	Stena Hibernia/Stena Scotia	1,094	*No Change*					
Seatruck	HEY – WAR	Seatruck Performance/Seatruck Precision	1,099*	100.3	480	15.4	101.4	+1.1	+4.3
	HEY – DUB	Seatruck Pace/Seatruck Panorama	606**	109.3	480	15.0	109.4	+0.1	+0.3
	LIV – DUB	Clipper Pennant/Seatruck Pace/Seatruck Power Clipper (Seatruck) Progress Seatruck Panorama (2019 Only)	2,091	*No Change*					
P&O	LIV – DUB	Mistral/Norbank/Norbay	1,162						

Table A.2: Increase in distance for impacted cargo/tanker routes with Tier 1 and Tier 2 cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

Route	Approximate Annual Crossings (2022)	Baseline Distance (nm)	Deviated Distance	Additional Deviated Distance (nm)	Total Additional Distance/Year (nm)
Off Skerries TSS to Heysham (east)	23	59.9	64.7	4.8	110.4
Barrow (E) to Off Skerries TSS	4	72.7	73.9	1.2	4.8
Heysham to Off Skerries TSS (west)	7	62.0	64.9	2.9	20.3
Liverpool Bay TSS to W IoM (west)	533	67.6	69.7	2.1	1,119.3
Liverpool to E IoM – west	10	83.6	87.1	3.5	35
Liverpool to E IoM – central	54	77.3	78.0	0.7	37.8
Liverpool to E IoM - east	14	75.9	78.0	2.1	29.4
Douglas to Heysham	6	45.4	46.1	0.7	4.2
Liverpool to west IoM	153	66.3	69.0	2.7	413.1
Douglas to Liverpool Bay TSS (east)	9	67.4	73.9	6.5	58.5
Off Skerries TSS to Solway Firth	42	73.2	74.3	1.1	46.2
Douglas to Liverpool Bay TSS	8	59.8	60.2	0.4	3.2
Liverpool Bay TSS to Northern Irish Sea (W)	55	65.2	65.9	0.7	38.5
Douglas to Liverpool	6	58.9	58.3	-0.6	-3.6

Isle of Man Steam Packet Company

A.1.1.1.9 The IoMSPC route between Douglas and Liverpool with approximately 625 movements per year would need to deviate to the east of the Mona Array Area and to the west of the Morgan Array Area. The additional distance and service speed for the Manannan would result in approximately 0.3 nm/0.5 minutes of additional transit time.

A.1.1.1.10 The IoMSPC route between Heysham and Douglas with approximately 1,300 movements per year would need to deviate around the Morgan Array Area and pass west of the Walney Offshore Wind Farms. The additional distance and service speed would result in approximately 0.5 nm/1.6 minutes of additional transit time.

A.1.1.1.11 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), the IoMSPC Heysham to Douglas would be further affected. The Heysham to Douglas route would be further constrained when passing between the Morgan Array Area and

the boundary of Mooir Vannin Offshore Wind Farm, due to the narrow width which may cause congestion and a reduction in speed.

A.1.1.1.12 As daily services of IoMSPC ferries would be impacted, the magnitude is therefore, considered to be **high**.

Stena Line

A.1.1.1.13 The Stena route between Liverpool and Belfast to the west of the Isle of Man with approximately 1,500 movements per year directly intersects the Mona Array Area. A revised passage plan was developed which assumed these vessels would navigate between the Morecambe Generation Assets Array Area and the Mona Array Area, pass between the Mona and Morgan Array Areas and alter course to pass to the southwest of the Isle of Man. The additional distance and service speed would result in approximately 1.4 nm/4.5 minutes of additional transit time.

A.1.1.1.14 The Stena route between Liverpool and Belfast to the east of the Isle of Man with approximately 350 movements per year intersects the Morecambe and Morgan Array Areas. The revised passage plan passes to the west of the Morecambe Generation Assets Array Area, before turning north and then west between the Morgan Array Area and Walney Offshore Wind Farms. The additional distance and service speed would result in approximately 4 nm to 5 nm/13 to 16 minutes of additional transit time dependent on which route through the Morecambe gas field was taken.

A.1.1.1.15 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), the Stena Liverpool to Belfast (east of the Isle of Man) would be further affected. The Stena route would necessarily deviate further northeast to pass between the Walney Extension and the boundary of Mooir Vannin Offshore Wind Farm. This could increase journey times by a further 20 minutes in addition to deviations caused by other Tier 2 projects.

A.1.1.1.16 As daily services of Stena Line ferries would be impacted, the magnitude is therefore, considered to be **high**.

Seatruck Ferries

A.1.1.1.17 The Seatruck route between Heysham and Warrenpoint with approximately 1,100 movements per year passes through the south boundary of the Morgan Array Area. Vessels would depart Heysham as they currently do, passing north of the South Morecambe Gas Field but deviating southwest to pass between the Mona and Morgan Array Areas before turning westward towards Carlingford Lough. This would necessitate an additional 1.1 nm/4.3 minutes of steaming time per trip.

A.1.1.1.18 The Seatruck route between Heysham and Dublin with approximately 600 movements per year passes through the north boundary of the Mona Array Area. Vessels would depart Heysham as they currently do, passing north of the South Morecambe Gas Field but deviating to pass between the Mona and Morgan Array Areas, before turning southwest towards Dublin. This would necessitate an additional 0.1 nm/0.3 minutes of steaming time per trip.

A.1.1.1.19 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there would be no direct impact on these routes.

A.1.1.1.20 As daily services of Seatruck Ferries would be impacted, the magnitude is therefore, considered to be **high**.

Commercial cargo/tanker operators

A.1.1.1.21 One cargo/tanker route with more than one movement per day would be directly impacted by the Mona Array Area, namely through the Liverpool Bay TSS to the northwest. The required deviation to pass clear of the Mona Array Area is approximately 2 nm and is unaffected by the cumulative projects.

A.1.1.1.22 A further 13 cargo/tanker shipping routes were identified which would be deviated around the cumulative projects, including routes into Douglas, Heysham and Barrow. The majority of these minor routes have less than one vessel transit per week but have relatively greater deviations.

A.1.1.1.23 The most impacted route is between Off Skerries TSS and Heysham with an additional 4.8 nm of steaming above 72.7 nm. However, less than one vessel per month utilises this route. The majority of other deviated routes have relatively few transits and are anticipated to pass between the Mona and Morgan Array Areas or deviate to the southwest of Mona Array Area. Some routes have minor reductions in distance where deviated routes are more direct than are currently taken. This necessitates greater course changes to pass between the array areas, or in some cases, necessitates not utilising the Liverpool Bay TSS when previously this would have been used.

A.1.1.1.24 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), some commercial routes would be further affected. In particular, a cumulative impact on the Silver River regular trade between Ramsey and Glasson would be experienced by the presence of the Mooir Vannin Offshore Wind Farm which would be similar to that in isolation.

A.1.1.1.25 As daily services of strategically important routes would be impacted, the magnitude is therefore, considered to be **high**.

Sensitivity of receptor

Isle of Man Steam Packet Company

A.1.1.1.26 The IoMSPC route between Douglas and Liverpool with approximately 625 movements per year will require thirty seconds of additional transit duration. On a three hour service, which has greater existing variation in transit duration and turn around time, this is not anticipated to impose significant operational impacts.

A.1.1.1.27 The IoMSPC route between Douglas and Heysham with approximately 1,300 movements per year will require less than two minutes of additional transit duration. On a four hour service, which has greater existing variation in transit duration and turn around time, this is not anticipated to impose significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints.

A.1.1.1.28 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), the Douglas to Heysham route would have a further minor increase in delays.

A.1.1.1.29 The sensitivity of this receptor is therefore, considered to be **low**.

Stena Line

A.1.1.1.30 The Stena route between Liverpool and Belfast to the west of the Isle of Man with approximately 1,500 movements per year would necessitate an additional 4.5 minutes of steaming time per trip. The route to the east of the Isle of Man would necessitate

between a 13 and 16 minute increase in steaming time per trip. On an eight hour service, which has greater existing variation in transit duration and turn around time, this is not anticipated to impose significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints..

A.1.1.1.31 With the addition of Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Scoping Report see Mooir Vannin Offshore Wind Limited, 2023), the additional transit time for the Stena Line route east of the Isle of Man could make such a route unviable and all future Stena traffic may need to pass west of the Isle of Man, posing a greater operational constraint. Similarly, the narrow width of the route between the Morgan Array Area and Mooir Vannin Offshore Wind Farm could cause delays as vessels must slow down to avoid other traffic more regularly.

A.1.1.1.32 The sensitivity of this receptor is therefore, considered to be **medium**.

Seatruck Ferries

A.1.1.1.33 The Seatruck routes between Heysham and Dublin and Heysham and Warrenpoint will require an additional 0.3 and 4.3 minutes of steaming time per trip respectively. On an eight hour service, which has greater existing variation in transit duration and turn around time, this is not anticipated to impose significant operational impacts but may increase pressure on operators, such as additional fuel cost, emissions and potential operating constraints..

A.1.1.1.34 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there would be no direct impact on these routes.

A.1.1.1.35 The sensitivity of this receptor is therefore, considered to be **low**.

Commercial cargo/tanker operators

A.1.1.1.36 For cargo/tanker routes, the principal routes with more than one vessel transit per day would need approximately 2 nm of deviation to pass clear of the Mona Array Area. This increase is minor considering the length of journeys taken by cargo/tanker vessels between international ports which are likely to be hundreds or thousands of miles. It is, therefore, not anticipated to have any material impact upon the viability of these routes into Liverpool.

A.1.1.1.37 The majority of minor routes have less than one vessel transit per week but would require greater deviations to their routes. The route which has the most impacted are between the Off Skerries TSS and Heysham (4.8 nm). Given the length of the journeys and the speed of transit, this is not anticipated to have any significant impacts upon the viability of these routes.

A.1.1.1.38 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there would be a direct impact on the MV Silver River route between Ramsey and Glasson that may necessitate potentially significant deviations around the Mooir Vannin Offshore Wind Farm. Given the constraints on both Ramsey and Glasson and the additional distance this may cause more significant operational challenges. Furthermore, routes used by small coastal traffic to the east of the Isle of Man could have substantial additional deviations.

A.1.1.1.39 Given the accumulation of impacts and deviations to multiple routes and the loss of the viability of some route options, the sensitivity of the receptor is considered to be **medium**.

Significance of effect

A.1.1.1.40 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.3.

Table A.3: Magnitude, sensitivity and impact significance relating to cumulative impact to commercial operators including strategic routes and lifeline ferries during construction of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man.
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.

A.1.1.1.41 Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.1.1.1.42 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Operations and maintenance phase

A.1.1.1.43 During the operations and maintenance phase of the cumulative projects, large commercial ships would not transit through the array areas due to the proximity of structures and would be required to route around the array areas. The impact on vessel routeing would therefore be similar to the latter stages of construction where vessels are displaced by construction buoyage, safety zones and the presence of structures. The operations and maintenance phase would be longer than other phases at up to

35 years compared to up to four years for the construction phase. During operations and maintenance, there would be far less Morgan Generation Assets vessels operating within and around the Morgan Array Area interacting with other passing vessels. As a result, the cumulative impacts to commercial operators including strategic routes and lifeline ferries during operations and maintenance are not anticipated to be substantially different to those during construction.

A.1.1.1.44 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.4. Appropriate further mitigation listed for the construction phase of the Morgan Generation Assets will be considered for the operations and maintenance phase.

Table A.4: Magnitude, sensitivity and impact significance relating to cumulative impact to commercial operators including strategic routes and lifeline ferries during operations and maintenance of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man.
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.

A.1.1.1.45 Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.1.1.1.46 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Decommissioning phase

A.1.1.1.47 The cumulative impacts to commercial operators including strategic routes and lifeline ferries during decommissioning are not anticipated to be substantially different to those during construction. During both the construction and the decommissioning phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of decommissioning buoyage or structures.

The cumulative impact on vessel routeing will, therefore, be the same. However, it should be noted that the cumulative impacts will reduce as decommissioning progresses and the number of structures within the Morgan Array Area reduces.

A.1.1.1.48 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.5. Appropriate further mitigation listed for the construction phase of the Morgan Generation Assets will be considered for the decommissioning phase.

Table A.5: Magnitude, sensitivity and impact significance relating to cumulative impact to commercial operators including strategic routes and lifeline ferries during decommissioning of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Stena Line	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given the optionality to route west of the Isle of Man.
Seatruck Ferries	High	Low	Minor which is not significant in EIA terms. A minor rather than moderate effect has been determined given the minimal increase in journey times which are within the existing natural variation of operator schedules.
Commercial cargo/tanker	High	Medium	Moderate which is significant in EIA terms. A moderate rather than major effect has been determined given that the principal shipping routes within the Irish Sea are not significantly effected.

A.1.1.1.49 Following the identification of significant effects on commercial operators including strategic routes and lifeline ferries within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.1.1.1.50 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

A.2 Impact on adverse weather routeing

A.2.1 Scenario 3

A.2.1.1 Morgan Offshore Wind Project: Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and all other relevant projects

A.2.1.1.1 The assessment on shipping and navigation with Tier 1 projects, principally the Awel y Môr Offshore Wind Farm, did not result in levels of significance that were above those of the Morgan Generation Assets individual assessment, or when including the

Transmission Assets. This is because there is a substantial spatial separation between the two offshore wind projects and few vessel routes are impacted by both. Therefore, the CEA for shipping and navigation has taken an approach to assessment which considers the cumulative effects with both Tier 1 and Tier 2 projects together.

Construction phase

A.2.1.1.2 The construction of the Morgan Generation Assets, in combination with the construction or operation of the Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Generation Assets and the Mooir Vannin Offshore Wind Farm have a potential cumulative impact on adverse weather routes. During significant wind and wave conditions, it can be hazardous for ferries to navigate beam on to the prevailing conditions, which can cause excessive roll that may result in cargo shift or injuries to passengers.

A.2.1.1.3 Where significant adverse weather is encountered, standard operating practices would be for the master to advise passengers to remain seated and for vessels to take less direct routes to take advantage of lees from land masses, avoid dangerous sea states or minimise the motions onboard. The navigation simulations (see Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) demonstrated that without being able to adequately weather route, excessive roll was experienced that reduced control and would be both uncomfortable or dangerous to passengers and cargo.

A.2.1.1.4 This impact within the shipping and navigation chapter of the Environmental Statement has been limited to the impact on the ferry route. Ferry services in the shipping and navigation study area are important for facilitating trade, tourism and other important functions. In particular, consultees emphasised that services between the Isle of Man and the UK are lifeline services which carry food, medical supplies and goods which are crucial in a just-in-time economy. The socio-economics approach for considering potential impacts of the Morgan Generation Assets on the IoM is set out within Volume 2, Chapter 13: Socio-economics chapter of the Environmental Statement.

Magnitude of impact

A.2.1.1.5 During construction, vessel traffic would be displaced from the Morgan Array Area and Tier 1 and Tier 2 projects due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain safe passing distance of at least 1 nm from navigational hazards, likely greater in adverse weather.

A.2.1.1.6 Where vessel routes do not directly intersect the Morgan Array Area, but do intersect other Tier 1 and Tier 2 projects, they have been included within the cumulative assessment as there are cumulative impacts upon operators/ports with multiple routes. Furthermore, the presence of all cumulative projects will indirectly affect the master decision making and passage planning.

A.2.1.1.7 During adverse weather, some sailings are delayed or inevitably cancelled irrespective of the presence of the cumulative projects. However, with the presence of the cumulative projects, where sailings are safe to take place, they may be required to route a greater distance and duration. Over the course of a day, the accumulation of these delays could result in the potential for additional sailings to be cancelled where constraints such as hours of rest are exceeded. Such effects are already experienced by operators, but the presence of the cumulative projects may exacerbate this.

A.2.1.1.8 During consultation and navigational simulations, the conditions in which adverse weather routes would be taken, or services cancelled, was shown to be dependent on

many different factors including route, vessel, wind/wave directions, wind speed and wave height. Figure A.3 shows that several adverse weather routes either intersect or pass immediately adjacent to the cumulative projects.

A.2.1.1.9 The construction activities will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the construction area
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (an outline of this plan has been submitted with the Application, Document Reference J17).

Table A.6: Impact on ferry routeing in adverse weather with Tier 1 and Tier 2 cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

Operator	Route	Example Vessels (2019 to 2022)	Approximate Annual Crossings Effected	Baseline Distance (nm)	Baseline Time (Minutes)	Total Delay Base Case (Minutes)	Future Case Distance (nm)	Additional Project Delays on Base Case (Minutes)	Total Delay with Projects Will be at Least (Minutes)
IoMSPC	HEY – DOUG	Ben-my-Chree	17-21	50.1	225	+10 to +23	56.4	+24	+34 to +47
	LIV – DOUG	Manannan	31-34	61.2	165	+10 to +33	66.6	+13	+23 to +46
Stena Line	LIV – BEL W	Stena Edda Stena Embla Stena Mersey	15-20	121.2	480	+20 to +60	121.2	+0	+20 to +60
	LIV – BEL E (W of Calder)	Stena Horizon Stena Lagan Stena Forecaster Stena Forerunner	8-13	114.0	480	+0 to +30	134.8	+70	+70 to +100
	HEY – BEL	Stena Hibernia Stena Scotia	24-69	106.9	480	+40 to +70	123.8	+63	+103 to +133
Seatruck	HEY – WAR	Seatruck Performance Seatruck Precision	38-44	102.0	480	+27	102.2	+1	+28
	HEY – DUB	Seatruck Pace Seatruck Panorama	25-27	110.8	480	+28	110.8	+0	+28

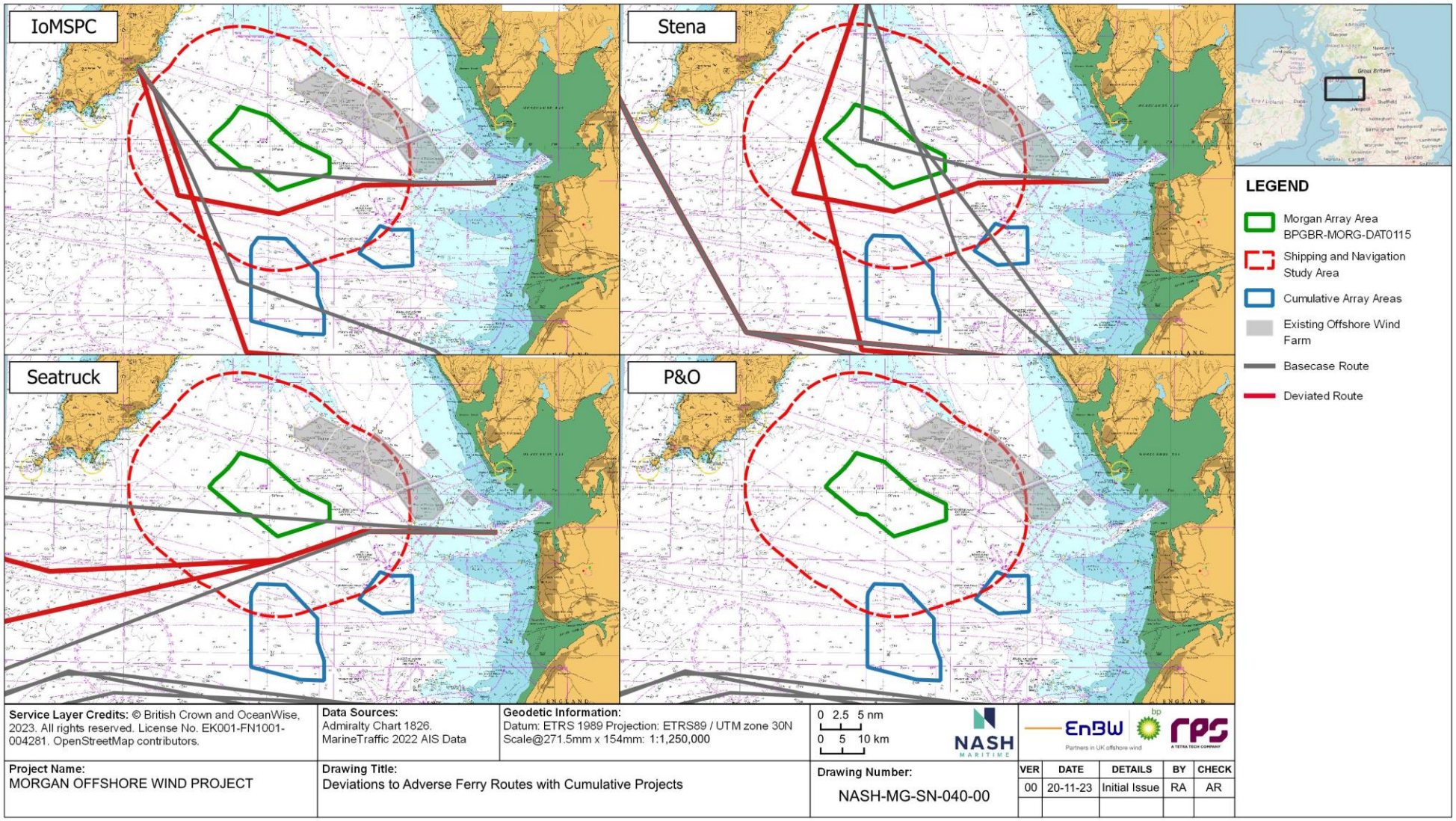

Figure A.3: Deviations to adverse ferry routes with cumulative projects (excluding Mooir Vannin Offshore Wind Farm).

Isle of Man Steam Packet Company

A.2.1.1.10 During the navigation simulations, it was determined that the IoMSPC service between Liverpool and Douglas (Manannan) would be impacted at between 2.0 m and 2.5 m Hs. This equates to greater than a Force 5 occurring approximately fortnightly. Based on a review of AIS data for 2022, it was estimated that the Manannan makes significant adverse weather routeing on at least 30 occasions per year of a total of 600 crossings. However, it was noted that the Manannan would more likely reduce speed before choosing to weather route. The Manannan is restricted to sailing in conditions where the significant wave height is less than 3.5 m as it is more susceptible to weather than other vessel designs.

A.2.1.1.11 The IoMSPC service between Heysham and Douglas (Ben My Chree) would be impacted at a significant wave height of between 2.5 m and 3.0 m. This equates to greater than a Force 6 occurring at least monthly in summer and winter. Based on a review of AIS data for 2022, it was estimated that the Ben My Chree makes significant adverse weather routeing on at least 20 occasions per year of a total of 1,300 crossings.

A.2.1.1.12 It was noted that masters may be more precautionary in weather routeing and less likely to choose to route either east of the Mona Array Area or between the Morgan Array Area and the Walney offshore wind farms as they would have reduced optionality should conditions deteriorate and they need to turn towards the southwest to minimise the motion of the vessel. Therefore, the presence of the cumulative projects could increase the number of occasions during which adverse weather routes are taken.

A.2.1.1.13 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), the sea room available for transit east of the Morgan Array Area would be substantially reduced. Therefore, it is likely that the metocean thresholds for which masters would navigate this route would be further reduced and a greater number of adverse weather passages would be taken with the inclusion of the Mooir Vannin Offshore Wind Farm.

A.2.1.1.14 Given that the adverse weather routeing of a ferry service is anticipated to be impacted infrequently, but multiple times per year, the magnitude is considered to be **medium**.

Stena Line

A.2.1.1.15 During the navigation simulations, it was determined that the Stena route between Liverpool and Belfast would be impacted at 3.0 m Hs. This equates to greater than a Force 7 occurring at least monthly in winter. Based on a review of AIS data for 2022, it was estimated that Stena ferries make significant adverse weather routeing on at least 20 occasions per year of a total of 1,500 crossings

A.2.1.1.16 The Stena route between Heysham and Belfast would be impacted at 3.0 m Hs. This equates to greater than a Force 7 occurring at least monthly in winter. Based on a review of AIS data for 2022, it was estimated that Stena ferries make significant adverse weather routeing on at least 50 occasions per year of a total of 1,100 crossings

A.2.1.1.17 It was noted that masters may be more precautionary in weather routeing and less likely to choose to route either east of the Mona Array Area or between the Morgan Array Area and the Walney offshore wind farms as they would have reduced optionality should conditions deteriorate and they need to turn towards the southwest to minimise the motion of the vessel. Therefore, the presence of the cumulative projects could increase the number of occasions during which adverse weather routes are taken.

A.2.1.1.18 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), it is likely that the route east of the Isle of Man used by both the Heysham to Belfast and Liverpool to Belfast routes would no longer be realistic. In particular, this would require multiple, substantial alterations of course and constrained passages when passing around the Mooir Vannin Offshore Wind Farm.

A.2.1.1.19 Given that the adverse weather routeing of a ferry service is anticipated to be impacted infrequently, but multiple times per year, the magnitude is considered to be **medium**.

Seatruck Ferries

A.2.1.1.20 The Seatruck routes between Heysham and Ireland exhibit adverse weather routeing further west and therefore the impact on their routes is not dissimilar between the normal conditions and adverse conditions in proximity of the cumulative projects. The most extreme passage plans to the southwest provided by Seatruck would necessitate a deviation to the north around the Mona Array Area, but relatively few transits were identified taking these routes in either 2019 or 2022.

A.2.1.1.21 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there would be no additional direct impact on these routes.

A.2.1.1.22 Given that the adverse weather routeing of a ferry service is anticipated to be impacted rarely, the magnitude is considered to be **low**.

Commercial cargo/tanker operators

A.2.1.1.23 Analysis of cargo/tanker vessel traffic in adverse weather events did not identify any appreciable changes in vessel routes. During Met Office named storm events, with gale/storm force winds, there was a greater use of the anchorage to the east of Anglesey.

A.2.1.1.24 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), the relatively few cargo/tanker vessels passing to the east of the Isle of Man will be more restricted in marginal weather conditions due to the reduced sea room between the Morgan Array Area and Mooir Vannin Offshore Wind Farm.

A.2.1.1.25 The magnitude of the receptor is therefore, considered to be **low**.

Sensitivity of receptor

A.2.1.1.26 Figure A.3 shows anticipated adverse weather routeing with and without the cumulative projects. The 2022 AIS data has been used to estimate the cumulative impact on vessel routes in adverse weather. Each revised passage plan was developed by the NASH project team, including master mariners. These passage plans are based on existing passage plans provided by operators during consultation (such as passing at least 1.5 nm from a wind turbine) and informed by the results of the navigation simulation sessions (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement).

A.2.1.1.27 During the most severe weather, some services may be cancelled, irrespective of the cumulative projects. However, on some occasions the existing delays due to deviations in adverse weather may result in sailings to be cancelled where hours of rest or schedule constraints are exceeded.

A.2.1.1.28 During adverse weather, cargo shift as a result of reduced optionality on vessel heading could cause minor injuries and property damage.

Isle of Man Steam Packet Company

A.2.1.1.29 The 2022 AIS data shows that the IoMSPC Liverpool to Douglas adverse weather routeing accounts for an additional 10 to 33 minutes of journey time, on a 165 minute journey. These transits tend to trend to the southwest of their typical passage plans and therefore it has been assumed that vessels would pass to the south and west of the Mona Array Area. This would lead to a further increase in transit times of 13 minutes, giving a total delay of at least 23 minutes when compared to the normal route. This cumulative impact would be the same as it is for the individual Mona Offshore Wind Project assessment, however, masters may more regularly choose this route than to pass between the Mona, Morgan and Morecambe Array Areas.

A.2.1.1.30 The 2022 AIS data shows that the IoMSPC Heysham to Douglas adverse weather routeing accounts for an additional 10 to 23 minutes of journey time. Whilst the route between the Walney offshore wind farms and Morgan Generation Assets Array Areas is wider than that assessed during the PEIR, there remains a weather threshold on safe transit and therefore masters would choose to pass between the Mona and Morgan Generation Assets Array Areas, before transiting to the west of the Morgan Generation Assets Array Area. This would lead to a further increase in transit time of 24 minutes, giving a total delay of at least 34 minutes when compared to the normal route.

A.2.1.1.31 Constraints on manning levels are likely to be far greater for the IoMSPC than other operators as have a single bridge team who do not live aboard the vessel. The Maritime Labour Conventions sets out requirements for minimum hours of rest and existing schedules and crew rosters are designed around these requirements. Existing deviations, in combination with the additional deviations due to the cumulative projects would accumulate for each sailing during a prolonged period of adverse weather. Due to the complexity of operator schedules and the interrelationship between metocean conditions and operational impacts the effects of this would vary each day, but it is credible that services could be cancelled more frequently.

A.2.1.1.32 With the addition of Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Scoping report), there are additional impacts on the IoMSPC route between Heysham and Douglas. The width between the Scoping boundary of Mooir Vannin Offshore Wind Farm and the Morgan Array Area is 2.5 nm which is deemed to be insufficient for safe navigation in adverse weather. This would likely require more frequent adverse weather routeing than just with the presence of the Morgan Array Area.

A.2.1.1.33 On the basis that some services of a ferry could be more frequently cancelled, the sensitivity of the receptor is therefore, considered to be **medium**.

Stena Line

A.2.1.1.34 Crews operating the Stena Heysham to Belfast route may choose not to transit between Barrow and the West of Duddon Sands offshore wind farm and instead pass to the west of the offshore wind farm. Within the 2022 data, vessels choosing to take this route incurred an additional 40 to 70 minutes of transit time. With the cumulative array areas in place, (and should the route between Morgan Generation Assets Array Area and Walney array areas be deemed unnavigable in adverse weather) vessels would pass to the west of the Morgan Array Area before proceeding north (to the east of the Isle of Man). This is estimated to incur a further increase in transit times of 63

minutes, giving a total delay of at least 103 minutes when compared with the normal route. Alternatively, vessels may elect to continue further west and pass to the west of the Isle of Man.

A.2.1.1.35 Stena's Liverpool to Belfast adverse weather routes tend to trend to the southwest of their typical passage plans, towards the prevailing conditions. Within the 2022 data, this accounted for an additional 15 to 20 minutes of transit time. The footprint of the Mona Array Area is clear of the key adverse weather routes taken by Stena Line, however, the presence of the Projects may require Stena Line to more frequently take this adverse weather route, increasing journey times. Whilst distances are provided in Table A.6 for increased transit distance for an east of Isle of Man route, the reduced sea room and frequent course changes may make this unattractive.

A.2.1.1.36 With the addition of Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Scoping report), there are additional impacts on the Stena route between Liverpool and Belfast. The width between the Scoping boundary of Mooir Vannin Offshore Wind Farm and the Morgan Array Area is 2.5 nm which is deemed to be insufficient for safe navigation in adverse weather. This would likely require more frequent adverse weather routeing than just with the presence of the Morgan Array Area. Similarly, where Stena Line vessels choose to navigate east of the Isle of Man in adverse weather, the additional distance as a result of the presence of Mooir Vannin Offshore Wind Farm could make this adverse weather route unviable.

A.2.1.1.37 The sensitivity of this receptor is therefore, considered to be **medium**.

Seatruck Ferries

A.2.1.1.38 The presence of the both the Mona and Morgan Array Areas constrains the weather routeing optionality for Seatruck ferries operating to and from Heysham. However, there is minimal deviation from typical routes in these areas.

A.2.1.1.39 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there would be no additional direct impact on these routes.

A.2.1.1.40 As the majority of Seatruck adverse weather routes are clear of the cumulative projects, the sensitivity is considered to be **low**.

Commercial cargo/tanker operators

A.2.1.1.41 With the addition of Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Scoping report), there are additional impacts on cargo/tanker routes. The width between the Scoping boundary of Mooir Vannin Offshore Wind Farm and the Morgan Array Area is 2.5 nm which is deemed to be insufficient for safe navigation in adverse weather. This would likely require more frequent adverse weather routeing than with other Tier 1 and Tier 2 projects.

A.2.1.1.42 With the addition of the Mooir Vannin Offshore Wind Farm (based on the array boundary presented within the Mooir Vannin Offshore Wind Farm Scoping report), there may be an increase in delays and cancellations for less time sensitive cargo/tanker services.

A.2.1.1.43 As there is little evidence of major adverse weather routeing near to the cumulative projects, the sensitivity is considered to be **medium**.

Significance of effect

A.2.1.1.44 Overall, the magnitude of the cumulative impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

A.2.1.1.45 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.7.

Table A.7: Magnitude, sensitivity and impact significance relating to cumulative impact to adverse weather routeing during construction of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms
Stena Line	Medium	Medium	Moderate which is significant in EIA terms
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.
Commercial cargo/tanker	Low	Medium	Minor which is not significant in EIA terms

A.2.1.1.46 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.2.1.1.47 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination processes.

Operations and maintenance phase

A.2.1.1.48 During the operations and maintenance phase of the cumulative projects, large commercial ships would not transit through the array areas due to the proximity of structures and would be required to route around the array areas. The impact on vessel routeing would therefore be similar to the latter stages of construction where vessels are displaced by construction buoyage, safety zones and the presence of structures. The operations and maintenance phase would be longer than other phases at up to 35 years compared to up to four years for the construction phase. During operations and maintenance, there would be far less Morgan Generation Assets vessels operating within and around the Morgan Array Area interacting with other passing vessels. As a result, the cumulative impacts to adverse weather routeing during operations and maintenance are not anticipated to be substantially different to those during construction.

A.2.1.1.49 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.8. Appropriate further mitigation listed for the construction phase of the Morgan Generation Assets will be considered for the operations and maintenance phase.

Table A.8: Magnitude, sensitivity and impact significance relating to cumulative impact to adverse weather routeing during operations and maintenance of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms
Stena Line	Medium	Medium	Moderate which is significant in EIA terms
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.
Commercial cargo/tanker	Low	Medium	Minor which is not significant in EIA terms

A.2.1.1.50 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.2.1.1.51 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination processes.

Decommissioning phase

A.2.1.1.52 The cumulative impacts to adverse weather routeing during decommissioning are not anticipated to be substantially different to those during construction. During both the construction and the decommissioning phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, whether through the presence of decommissioning buoyage or structures. The cumulative impact on vessel routeing will, therefore, be the same for the decommissioning phase. However, it should be noted that the cumulative impacts will reduce as decommissioning progresses and the number of structures within the Morgan Array Area reduces.

A.2.1.1.53 A summary of the impact magnitude, sensitivity and overall effect significance is provided in Table A.9. Appropriate further mitigation listed for the construction phase of the Morgan Generation Assets will be considered for the decommissioning phase.

Table A.9: Magnitude, sensitivity and impact significance relating to cumulative impact to adverse weather routeing during decommissioning of the Morgan Generation Assets.

Operator	Magnitude	Sensitivity	Significance
IoMSPC	Medium	Medium	Moderate which is significant in EIA terms
Stena Line	Medium	Medium	Moderate which is significant in EIA terms
Seatruck Ferries	Low	Low	Minor which is not significant in EIA terms. A minor rather than negligible effect has been determined given that infrequent conditions may be encountered for which the preferred adverse weather route is disrupted.
Commercial cargo/tanker	Low	Medium	Minor which is not significant in EIA terms

A.2.1.1.54 Following the identification of significant effects on adverse weather routeing within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.2.1.1.55 The Applicant has committed to engaging with affected stakeholders. The Applicant will seek to continue this engagement beyond submission of the application and run in parallel with the application determination processes.

A.3 Impact on vessel to vessel collision risk

A.3.1 Scenario 3

A.3.1.1 Morgan Offshore Wind Project: Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and all other relevant projects

A.3.1.1.1 The assessment on shipping and navigation with Tier 1 projects, principally the Awel y Môr Offshore Wind Farm, did not result in levels of significance that were above those of the Morgan Generation Assets individual assessment, or when including the Transmission Assets. This is because there is a substantial spatial separation between the two offshore wind projects and few vessel routes are impacted by both. Therefore, the CEA for shipping and navigation has taken an approach to assessment which considers the cumulative effects with both Tier 1 and Tier 2 projects together.

Construction phase

A.3.1.1.2 The construction of the Morgan Generation Assets, in combination with the construction or operation of the Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Offshore Wind Farm Generation Assets and Mooir Vannin could have a cumulative impact on vessel to vessel collision risk.

Magnitude of impact

A.3.1.1.3 During construction, vessel traffic would be displaced from the Tier 1 and Tier 2 offshore wind farm project array areas due to the presence of construction buoyage and safety zones around fixed structures which are under construction. It is anticipated that mariners would also maintain a safe passing distance of at least 1 nm from navigational hazards. Section 7.11.3 and appendix A.1 show that both cargo/tanker and ferry vessel routes will be deviated which could result in a convergence of vessels within routes between Tier 1 and Tier 2 projects.

A.3.1.1.4 Each of these routes are impacted by one or more array areas. Where vessel routes do not directly intersect the Morgan Array Area but do intersect other Tier 1 and Tier 2 projects, they have been included within the cumulative assessment as there are cumulative impacts upon operators/ports with multiple routes. Furthermore, the presence of all cumulative projects will indirectly affect the master decision making and passage planning.

A.3.1.1.5 The route between the Mona Array Area and Morgan Generation Assets has the following characteristics:

- Width of 6 nm with 3,600 vessel movements per year. An average vessel size of 155 m and a maximum vessel size of 289 m

- 9 to 16 ferry and 0.4 cargo/tanker ship movements anticipated per day through the route. There is potential for up to one recreational craft, two fishing boats and one service vessel in the route per day
- Meets MGN654 20-degree rule guidance and PIANC WG161 width guidance
- Modelling suggests that it is unlikely that two large commercial ships would meet between the Mona to Morgan Generation Assets Array Areas (probability of 2.4%).

A.3.1.1.6 The route between Mona Array Area and Morecambe Generation Assets has the following characteristics:

- Width of at least 5.7 nm and a length of 5.0 nm with 2,300 vessel movements per year. An average vessel size of 173 m and a maximum vessel size of 289 m
- 6 to 10 ferry and 0.4 cargo/tanker ship movements are anticipated per day through the route. Potential for up to two recreational craft, two fishing boats and one service vessel in route per day
- Meets MGN654 20-degree rule guidance and PIANC WG161 width guidance
- Modelling suggests that it is unlikely that two large commercial ships would meet between the Mona to Morecambe Generation Assets Array Areas (probability of 0.6%).

A.3.1.1.7 The route between the Morgan Generation Assets Array Area and Walney Offshore Wind Farms has the following characteristics:

- Width of at least 4.5 nm and a length of 11.5 nm with 2,100 vessel movements per year. An average vessel size of 132 m and a maximum vessel size of 215 m
- Anticipated 5 to 11 ferry and 0.5 cargo/tanker ship movements per day through route. Potential for up to two recreational craft, two fishing boats and one service vessel in route per day
- Meets MGN654 20-degree rule guidance and PIANC WG161 width guidance
- Modelling suggests that it is unlikely that two large commercial ships would meet between the Walney Offshore Wind Farms and Morgan Generation Assets Array Areas (probability of 0.6%).

A.3.1.1.8 During construction it is likely that recreational craft on passage will avoid the array areas. This will offset their transits into adjacent waters. However, analysis of recreational activity in section 7.5 demonstrated relatively few movements through the Morgan Array Area, as well as other Tier 1 and Tier 2 projects, and therefore are unlikely to be involved in a collision.

A.3.1.1.9 Large parts of the Irish Sea are fished and during construction there is potential that fishing activity might be displaced into adjacent waters. This is referred to as Spatial Squeeze, for which the National Federation of Fishermen's Organisations and Scottish Fishermen's Federation recently published a report (NFFO, 2022), and has the potential to increase the risk of collision. This would be greater with Tier 1 and Tier 2 projects given the greater extent of obstructions which could concentrate vessels into commercial routes with an increased collision risk.

A.3.1.1.10 The confluence of traffic in these regions will inevitably increase vessel encounters and therefore potential collision situations. Modelling undertaken within the CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) suggested that there would be a 15% increase in the number of encounters involving ferries and other large commercial vessels and an 8% increase in encounters between

cargo/tanker vessels but that there would be a decrease in encounters between large commercial vessels and small craft. Whilst it is unlikely that most of these situations will result in a collision, there will be some residual increase in risk. The modelling also demonstrated that the highest concentration of encounters would be to the south of the Mona Array Area, in the approaches to Liverpool, and well clear of the Morgan Generation Assets.

A.3.1.1.11 During full bridge simulations with ferry operators, collision situations were tested in normal and adverse weather conditions around the cumulative projects. There were no instances of collision occurrence between two vessels. It was demonstrated that the revised boundaries enabled the bridge teams to take appropriate action as required by the COLREGs for complex, realistic traffic situations where they were give way vessel, maintaining a desired CPA of at least 1.0 nm from other vessels and structures. It was noted that with the presence of the offshore wind farms, the master may be more frequently called to the bridge than at present to support the bridge team in managing these situations. Furthermore, it was noted that what were challenging situations and failed runs with the PEIR boundaries were much improved following the amendments made to the Mona, Morgan and Morecambe Potential Array Areas.

A.3.1.1.12 Quantitative risk modelling using IWRAP was undertaken within the CRNRA for large commercial vessels (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement). With an estimated 15% increase in vessel traffic, the collision risk modelling estimated an increase in collision risk between ferries increasing from once in 243 years (base case without cumulative projects) to once in 173 years (future case with cumulative projects). For cargo/tanker vessels in collision with ferries, this increase was from once in 187 to once in 163 years respectively. For cargo/tanker vessels in collision with other cargo/tanker vessels, this increase was from once in 1,267 to once in 933 years respectively.

A.3.1.1.13 The construction base or bases for the Tier 1 and Tier 2 projects are not yet determined, but there is potential for construction vessels in transit to Tier 1 and Tier 2 projects to be involved in a collision. The cumulative risks to construction vessels operating within Tier 1 and Tier 2 project sites would not be greater than each project in isolation (section 7.9.7).

A.3.1.1.14 The presence of the wind turbines may block or hinder the view of other vessels, resulting in ‘blind spots’ which could increase the risk of collision by reducing the capability for early and effective collision avoidance. Vessels may be visually less distinct amongst the wind turbines and less prominent through radar, particularly at night and in poor visibility. The minimum spacing of 1,400 m makes such situations unlikely, particularly when compared to other offshore wind farms in the Irish Sea. As part of the navigation simulations, night navigation was also tested and it was concluded that the presence of the offshore wind farms did not interfere with the normal ability to safely determine the nature and aspect of other traffic at night.

A.3.1.1.15 Most commercial ships would transit at least 1 nm from an offshore wind farm. For a fishing boat or recreational craft emerging from the boundary of a wind farm array area at 6 Knots, it would take 10 minutes to intersect the commercial ships path. For a CTV at 25 Knots, this is reduced to 2.4 minutes, albeit these vessels would carry AIS so would be more identifiable to passing vessels. Such challenges currently exist for the established Irish Sea offshore wind farms but are being successfully managed with no reported collisions as a direct result of reduced visibility of emerging vessels.

A.3.1.1.16 With the addition of the Scoping Boundary of Mooir Vannin, a 2.5 nm wide route is formed with the Morgan Generation Assets Array Area. The 2.5 nm width is insufficient to maintain adequate CPA from other vessels which might be encountered, and this

was confirmed during the navigation simulations and hazard workshops undertaken to inform the Environmental Statement. Therefore, an unacceptably high collision risk would result, considering likely meeting situations between ferries and small craft.

A.3.1.1.17 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the construction area
- Marking and charting of Morgan Array Area on nautical charts to facilitate safe passage planning
- Two lines of orientation and a regular layout of structures
- Wind turbine spacing will be at least 1,400 m
- A buoyed construction area and safety zones will offset third party traffic and construction vessels
- FLCP to reduce interactions between fishing vessels and Morgan Generation Assets (an outline of this plan has been submitted with the Application, Document Reference J11)
- Marine co-ordination will promote best practice during construction activities within the site
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (Document Reference J17).

A.3.1.1.18 The magnitude is therefore, considered to be **medium**.

Sensitivity of receptor

A.3.1.1.19 The sensitivity of collisions as a result of the cumulative impacts of Tier 1 and Tier 2 projects would not be substantially different to those described for the impact of the Morgan Generation Assets in isolation (section 7.9.7). Based on the evidence, literature and consultation, the NRA concluded that a most likely outcome for a ferry or passenger ship would be multiple injuries, moderate damage, minor pollution and widespread adverse publicity, with a worst credible outcome resulting in multiple loss of life. The most likely outcome for small craft was minor injuries, minor damage and no pollution. Loss of life was identified as a worst credible outcome for all other vessel types. Stakeholders advised that the worst credible outcome for a large vessel in collision with a small vessel would be multiple loss of life and the risk assessment was amended to reflect this.

A.3.1.1.20 The consequences of a collision during construction activities will be managed through adopted risk controls listed in Table 7.17:

- ERCoP to effectively respond to an incident
- Marine Pollution Contingency Plan
- Periodic exercises and training.

A.3.1.1.21 The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

A.3.1.1.22 The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) assessed 20 collision hazards which occurred during the construction or operations and maintenance phase of the projects cumulatively. At the hazard workshop undertaken to inform the Environmental Statement, a consensus was

reached with stakeholders that all of these would be Medium Risk – Tolerable if ALARP and that all previously High Risk hazards at PEIR had been successfully mitigated through boundary changes. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

A.3.1.1.23 However, with the inclusion of Mooir Vannin as a Tier 2 project, and the insufficient sea room with the Morgan Generation Assets Array Area, it is likely that High Risk – Unacceptable collision risks would exist for this route.

A.3.1.1.24 Overall, the magnitude of the cumulative impact is deemed to be medium, and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms. A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Generation Assets Array Area and the Scoping Boundary of Mooir Vannin.

A.3.1.1.25 Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.3.1.1.26 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Operations and maintenance phase

A.3.1.1.27 The operations and maintenance phase will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the Morgan Array Area
- Two lines of orientation and a regular layout of structures
- Wind Turbine spacing will be at least 1,400 m
- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- Fisheries Liaison and Co-existence Plan to manage interactions between fishing vessels and Morgan Generation Assets vessels (an outline of this plan has been submitted with the Application, Document Reference J11)
- Marine co-ordination will promote best practice during maintenance activities within the site.

A.3.1.1.28 The cumulative impacts to vessel to vessel collision risk during operations and maintenance of Tier 1 and Tier 2 projects are not anticipated to be substantially different to those during construction. During both the construction and the operations and maintenance phases of the cumulative projects, large commercial ships will not be able to transit through the array areas, and there may be small craft emerging from the construction site or operational array area, posing similar collision risks. The magnitude is therefore, considered to be **medium**.

A.3.1.1.29 The consequences of collision would not be substantially different to those described during construction. The sensitivity of the receptor is therefore, considered to be **high**.

A.3.1.1.30 Overall, the magnitude of the cumulative impact is deemed to be medium, and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms. A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Generation Assets Array Area and the Scoping Boundary of Mooir Vannin.

A.3.1.1.31 Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.3.1.1.32 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Decommissioning phase

A.3.1.1.33 The cumulative impacts to vessel to vessel collision risk are not anticipated to be substantially different to those during construction. However, it should be noted that the cumulative impacts will reduce as decommissioning progresses and the number of structures within the Morgan Array Area reduce.

A.3.1.1.34 The magnitude of the cumulative impact is therefore deemed to be medium, and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms. A moderate rather than major effect has been determined given that the collision risk would only be High Risk – Unacceptable for the route between the Morgan Generation Assets Array Area and the Scoping Boundary of Mooir Vannin.

A.3.1.1.35 Following the identification of significant effects on collision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.3.1.1.36 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

A.4 Impact on allision (contact) risk to vessels

A.4.1 Scenario 3

A.4.1.1 Morgan Offshore Wind Project: Generation Assets together with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and all other relevant projects

A.4.1.1.1 The assessment on shipping and navigation with Tier 1 projects, principally the Awel y Môr Offshore Wind Farm, did not result in levels of significance that were above those of the Morgan Generation Assets individual assessment, or when including the Transmission Assets. This is because there is a substantial spatial separation between the two offshore wind projects and few vessel routes are impacted by both. The CEA for shipping and navigation has therefore taken an approach to assessment which considers the cumulative effects with both Tier 1 and Tier 2 projects together.

Construction phase

A.4.1.1.2 The construction of the Morgan Generation Assets, in combination with the construction or operation of the Awel y Môr Offshore Wind Farm, Mona Offshore Wind Project, Morecambe Offshore Wind Farm: Generation Assets and the Scoping Boundary of Mooir Vannin could have a cumulative impact on allision (contact) risk.

Magnitude of impact

A.4.1.1.3 The construction of additional structures within the shipping and navigation study area increases the likelihood that navigating vessels will have a contact with them, with contact most likely to occur through human error or mechanical failure. During construction, this is exacerbated by the partially constructed nature of the sites.

A.4.1.1.4 As noted in section 7.11.3 and appendix A.1, Tier 1 and Tier 2 projects would create routes between the array areas which reduce the navigable width available to vessels. Firstly, the Mona to Morgan Generation Assets Array Areas at 6 nm in width with 3,600 vessel movements per year. Secondly, the Mona Array Area to Morecambe Generation Assets Array Area at least 5.7 nm in width with 2,300 movements per year. Thirdly, the Morgan Generation Assets Array Area to Walney Offshore Wind Farms array area at least 4.5 nm in width with 2,100 vessel movements per year. Fourthly, the Mona Array Area to the Awel y Môr Offshore Wind Farm array area at 6.8 nm and 10,000 vessel transits per year.

A.4.1.1.5 When navigating these routes, engine failure could cause vessels to drift and allide with a structure, or human error or steering failure could lead to a powered allision with a wind turbine or OSPs. Furthermore, given the increased vessel encounters within each route, as described in section 7.11.7 and appendix A.3, the likelihood of collision avoidance actions being taken by vessels forcing them out of the centre of the routes and closer to wind turbines is increased. This potentially increases the risk of allision.

A.4.1.1.6 Where conditions are extreme, vessels may choose to avoid navigating between the array areas or services may be cancelled (section 0 and appendix A.2). However, in less severe adverse weather conditions vessels may be required to navigate between the Tier 1 and Tier 2 array areas. With prevailing conditions beam-on to the vessel, a vessel may be offset from its track and manoeuvring may be more challenging. Furthermore, action to avoid cargo shift due to excessive roll may take vessels closer to wind turbines than they would otherwise choose. This would increase the risk of allision.

A.4.1.1.7 Quantitative risk modelling using IWRAP was undertaken within the NRA for large commercial vessels (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement). The modelling results were that the risk of allision with the cumulative projects, accounting for a 15% increase in traffic, would be once in 91 years

for cargo/tanker shipping and once in 203 years for ferries. Whilst the number of movements for ferries and cargo/tanker movements are similar, the significant proximity of large cargo/tanker vessels close to the array areas and the high redundancy of passenger vessels modelling in IWRAP have resulted in lower ferry allision scores.

A.4.1.1.8 The addition of the cumulative projects shows that the most southerly wind turbines of the Mona Array Area, adjacent to the main shipping routes have the greatest likelihood of allision. Furthermore, wind turbines at the periphery of the southern extent of the Morgan Generation Assets Array Area, and western extent of the Morecambe Generation Assets Array Area have relatively higher allision scores. The rerouting of traffic between the Morgan Generation Assets Array Area and Walney offshore wind farms have also resulted in higher risks with turbines at West of Duddon Sands and Walney Extension. It is also evident that the future case scenario shows lower allision scores for Millom West and the Morecambe Gas Field platforms due to reorientation of the existing shipping routes away from these structures.

A.4.1.1.9 During full bridge simulations with ferry operators (see Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) several runs tested the safety of navigating adjacent to the cumulative projects in both complex, realistic traffic scenarios and adverse weather. In all completed runs, it was demonstrated that the bridge teams were able to successfully respond to the situations whilst maintaining adequate CPA from other vessels and structures. It was noted that with the presence of the Morgan Array Area, the master may be more frequently called to the bridge than at present to support the bridge team in managing these situations. Furthermore, it was noted that what were challenging situations and failed runs with the PEIR boundaries were much improved following the amendments made to the Mona, Morgan and Morecambe Potential Array Areas.

A.4.1.1.10 Other risks of allision for vessels navigating elsewhere in the shipping and navigation study area, and for small craft including construction vessels, would be consistent as assessed for the Morgan Generation Assets in isolation (see section 7.9.8).

A.4.1.1.11 With the addition of the Scoping Boundary of Mooir Vannin Offshore Wind Farm, a 2.5 nm wide route is formed with the Morgan Generation Assets Array Area. The 2.5 nm width is insufficient to maintain adequate CPA from other vessels which might be encountered, and this was confirmed during the navigation simulations and hazard workshop undertaken to inform the Environmental Statement. Therefore, an unacceptably high allision risk would result, considering likely meeting situations and susceptibility to adverse weather on this route.

A.4.1.1.12 The construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the construction area
- Application for safety zones to separate construction activities and vessel navigation
- Guard vessels to manage vessel safety
- Blade clearance of at least 22 m from MHWS to avoid mastheads
- Two lines of orientation and a regular layout of structures
- Wind Turbine spacing will be at least 1,400 m

- Marking and charting of the Morgan Array Area on nautical charts to facilitate safe passage planning
- A buoyed construction area and safety zones will offset third party traffic and construction vessels
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets (an outline of this plan has been submitted with the Application, Document Reference J11)
- Marine co-ordination will promote best practice during construction activities within the site
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (Document Reference J17).

A.4.1.1.13 The magnitude is therefore, considered to be **medium**.

Sensitivity of receptor

A.4.1.1.14 The sensitivity of allisions as a result of the cumulative impacts of Tier 1 and Tier 2 projects would not be substantially different to those described for the impact of the Morgan Generation Assets in isolation as described in section 7.9.8. Based on the evidence, literature and consultation, the NRA concluded that a most likely outcome for a ferry or passenger ship would be multiple injuries, moderate damage, minor pollution and widespread adverse publicity, with a worst credible outcome resulting in multiple loss of life. The most likely outcome for small craft was minor injuries, minor damage and no pollution. Less numerous losses of life as compared to ferry allisions was identified as a worst credible outcome for all other vessel types, including small craft.

A.4.1.1.15 The consequences of a collision during construction activities will be managed through adopted risk controls listed in Table 7.17, specifically:

- ERCoP to effectively respond to an incident
- Marine Pollution Contingency Plan
- Periodic exercises and training.

A.4.1.1.16 The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

A.4.1.1.17 The CRNRA (Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement) assessed 28 allision hazards which occurred during the construction or operations and maintenance phase of the projects cumulatively. At the hazard workshop undertaken to inform the Environmental Statement, a consensus was reached with stakeholders that all of these would be Medium Risk – Tolerable if ALARP. The NRA concluded that given the presence of suitable risk controls and the disproportionality of any additional risk controls, where hazards were scored as Medium Risk, they could be defined as ALARP.

A.4.1.1.18 However, with the inclusion of Mooir Vannin as a Tier 2 project, and the insufficient sea room with the Morgan Generation Assets Array Area, it is likely that High Risk – Unacceptable allision risks would exist for this route.

A.4.1.1.19 Overall, the magnitude of the cumulative impact is deemed to be medium, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

A.4.1.1.20 Following the identification of significant effects on allision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.4.1.1.21 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Operations and maintenance phase

A.4.1.1.22 During the operations and maintenance phase of the Tier 1 and Tier 2 projects, the presence of the fully constructed array areas exposes large commercial vessels to similar cumulative impacts as during the construction phase, albeit for a longer duration. However, it is likely that operators will be more familiar to the layout and presence of the Morgan Array Area in combination with other cumulative projects following four years of construction.

A.4.1.1.23 Other risks of allision for vessels navigating elsewhere in the shipping and navigation study area, and for small craft including construction vessels, would be consistent as assessed for the Morgan Generation Assets in isolation (see section 7.9.8).

A.4.1.1.24 The operations and maintenance activities will be managed through adopted risk controls listed in Table 7.17:

- Promulgation of activities through the use of Notice to Mariners to ensure approaching vessels can safely avoid the Morgan Array Area
- Blade clearance of at least 22 m from MHWS
- Two lines of orientation and a regular layout of structures
- Wind Turbine spacing will be at least 1,400 m
- Marking and charting of Morgan Array Area on nautical charts to facilitate safe passage planning
- FLCP to reduce interactions between fishing vessels and the Morgan Generation Assets (an outline of this plan has been submitted with the Application, Document Reference J11)
- Marine co-ordination will promote best practice during construction activities within the site
- Vessel Traffic Management Plan to manage vessel safety and reduce potential impacts (Document Reference J17).

A.4.1.1.25 The magnitude is therefore, considered to be **medium**.

A.4.1.1.26 The consequences of allision would not be substantially different to those described during construction. The sensitivity of the receptor is therefore, considered to be **medium.**

A.4.1.1.27 The cumulative impacts to allision risk are not anticipated to be substantially different to those during construction.

A.4.1.1.28 Overall, the magnitude of the cumulative impact is deemed to be medium, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

A.4.1.1.29 Following the identification of significant effects on allision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.4.1.1.30 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.

Decommissioning phase

A.4.1.1.31 The cumulative impacts to allision risk are not anticipated to be substantially different to those during construction. However, it should be noted that the cumulative impacts will reduce as decommissioning progresses and the extent of structures within the Morgan Array Area reduces.

A.4.1.1.32 Overall, the magnitude of the cumulative impact is deemed to be medium, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

A.4.1.1.33 Following the identification of significant effects on allision risk within the PEIR, the Applicant has made substantial commitments to reduce these effects, including a reduction to the Morgan Array Area and additional control measures. Similar commitments made by the Mona Offshore Wind Project and Morecambe Generation Assets have further contributed to a reduction in this impact.

A.4.1.1.34 No mitigation is proposed by the Applicant. It is noted in Mooir Vannin Offshore Wind Farm Limited (2023) that the Shipping and Navigation impact assessment will be undertaken in line with the MCA Marine Guidance Note (MGN) 654 and its 'Methodology for Assessing Marine Navigational Safety and Emergency Response Risks'. It is therefore assumed that potential cumulative impacts will be addressed by Mooir Vannin Offshore Wind Farm through the planning process.