Awel y Môr Offshore Wind Farm

Category 6: Environmental Statement

Volume 2, Chapter 9: Shipping and Navigation

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Contents

Figures

Tables

Glossary of terms

TERM	DEFINITION
Adverse Weather Route	Routes favoured during periods of adverse weather conditions.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union (EU) fishing vessels over 15 m in length are required to carry AIS.
Allision	Contact between a vessel and a stationary object.
Base Case	The assessment of risk based on current shipping densities and traffic types as well as the existing marine environment.
Collision	Contact between two or more moving vessels.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity as defined by the International Maritime Organization (IMO).
Future Case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
Main Route	A route used on a regular basis by one or more vessels.
Marine Guidance Note (MGN)	Guidance released by the Maritime and Coastguard Agency (MCA) for the purposes of providing advice relating to the improvement of the safety of shipping and of life at sea.

TERM	DEFINITION
Regular Operator	A commercial operator associated with one or more vessels that transit an area on a regular basis.
IMO Adopted Routeing Measure	Predetermined shipping routeing systems established by the IMO.
Safety Zone	An area around a structure associated with an Offshore Renewable Energy Installation where entry is prohibited under the Energy Act 2004.
Traffic Separation Scheme (TSS)	A traffic-management route-system established by the International Maritime Organization (IMO) comprising traffic-lanes indicating the general direction of the vessels in that zone; vessels navigating within a TSS lane all transit in the same direction or cross the lane in an angle as close to 90 degrees (°) as possible.

Abbreviations and acronyms

TERM	DEFINITION
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AyM	Awel y Môr Offshore Wind Farm
BEIS	Department for Business, Energy & Industrial Strategy
BMAPA	British Marine Aggregate Producers Association
CBRA	Cable Burial Risk Assessment
COLREGs	Convention on International Regulations for Preventing Collisions at Sea
CoS	UK Chamber of Shipping

TERM	DEFINITION
CSIP	Cable Specification and Installation Plan
DCO	Development Consent Order
DECC	Department of Energy & Climate Change (now BEIS)
DfT	Department for Transport
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FSA	Formal Safety Assessment
GLA	General Lighthouse Authority
GyM	Gwynt y Môr Offshore Wind Farm
HMCG	Her Majesty's Coastguard
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
ITF	International Transport Forum
MAIB	Maritime Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
NPS	National Policy Statement

TERM	DEFINITION
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NUC	Not Under Command
O&G	Oil and Gas
OECD	Organisation for Economic Cooperation and Development
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
OWFIZ	Other Wind Farm Infrastructure Zone
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WTG	Wind Turbine Generator

Units

UNIT	DEFINITION
°	Degree
%	Percent
GW	Gigawatt
km	Kilometre
m	Metre
MW	Megawatt
NM	Nautical Mile

9 Shipping and Navigation

9.1 Introduction

1 This chapter assesses impacts to shipping and navigation users that may arise from the construction, operation and decommissioning of the Awel y Môr Offshore Wind Farm (AyM), developed by Awel y Môr Offshore Wind Farm Limited (the Applicant).

2 The assessment is primarily informed by Volume 4, Annex 9.1 (application ref: 6.4.9.1) which contains the Navigational Risk Assessment (NRA) that has been produced for AyM in line with Maritime and Coastguard Agency (MCA) requirements under their relevant guidance (see Section 9.2).

3 It is noted that in terms of fishing vessels, this chapter considers impacts associated with transit only. Impacts associated with active fishing are considered in Volume 2, Chapter 8: Commercial Fisheries (application ref: 6.2.8).

9.2 Statutory and policy context

4 Legislation and national policy deemed of relevance to shipping and navigation is summarised in Table 1. It is noted that this includes the EN-3 National Policy Statement (NPS) for Renewable Energy (Department for Business, Energy and Industrial Strategy (BEIS), 2011), of which a new draft version has been consulted on (consultation closed in November 2021). No substantive changes of pertinence to shipping and navigation have been identified within the new draft, however the updated paragraph numbers have been included in Table 1 for reference.

5 The Department for Transport (DfT) NPS for Ports (DfT, 2012) has also been included. Whilst this policy is not directly applicable to AyM, ports and port users have been identified as potential receptors and therefore certain elements of the NPS are considered relevant.

Table 1: Legislation and policy context.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
Welsh National Marine Plan (Welsh Government, 2019)	SOC_01: Access to the marine environment Proposals that maintain or enhance access to the marine environment are encouraged.	Impacts on displacement / deviation are assessed within Sections 9.10.1, 9.11.1, and 9.12.1
EN-3 NPS for Renewable Energy (Department of Energy & Climate Change (DECC), 2011) (*Now BEIS)	Paragraph 2.6.153 states: "*Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist.*"	Full details of consultation undertaken are provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), with a summary of key points given in Section 9.3 of this chapter.
	Paragraph 2.6.154 states: "*Assessment should be underpinned by consultation with the [...] MCA, the relevant General Lighthouse Authority (GLA), the relevant industry bodies (both national and local) and any*	All referenced parties have been consulted with as per Section 9.3.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected."	
	Paragraph 2.6.155 states: *"Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database."*	International Maritime Organization (IMO) adopted routeing measures (notably the Liverpool Bay Traffic Separation Scheme (TSS)) are considered as part of the baseline assessment (see Section 9.7.1). Marine traffic data has been used to determine Main Routes of relevance to AyM (see Section 9.7.3).
	Paragraph 2.6.156 states: *"Applicants should undertake a Navigational Risk Assessment (NRA) in accordance with relevant Government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above."*	The NRA is provided in Volume 4, Annex 9.1 (application ref: 6.4.9.1).

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	Paragraph 2.6.158 states: *"Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on navigation and shipping."* Paragraph 2.6.159 states: *"Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA and refer to the government guidance on safety zones."*	Potential impacts from safety zones have been considered for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). Worst case assumptions have been made as per Section 9.8.
	Paragraph 2.6.160 states: *"The potential effect on recreational craft, such as yachts, should be considered in any assessment."*	Potential impacts to recreational vessels have been considered for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
	Paragraph 2.6.161 states "The IPC should not grant development consent in relation to the construction	Relevant IMO routeing measures (i.e., the Liverpool Bay TSS) are considered relative to the array in

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	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."	Volume 4, Annex 9.1 (application ref: 6.4.9.1).
Draft EN-3 NPS for Renewable Energy Infrastructure (BEIS, 2021)	Paragraph 2.33.6 states *"Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist."*	Full details of consultation undertaken are provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), with a summary of key points given in Section 9.3 of this chapter.
	Paragraph 2.33.7 states *"Assessment should be underpinned by consultation with the MMO, Maritime and Coastguard Agency (MCA), the relevant General Lighthouse Authority, 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."*	All referenced parties have been consulted with as per Section 9.3.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	Paragraph 2.33.8 states *"Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database."*	International Maritime Organization (IMO) adopted routeing measures (notably the Liverpool Bay Traffic Separation Scheme (TSS)) are considered as part of the baseline assessment (see Section 9.7.1). Marine traffic data has been used to determine Main Routes of relevance to AyM (see Section 9.7.3).
	Paragraph 2.33.9 states *"Applicants should undertake a Navigational Risk Assessment (NRA) in accordance with relevant government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above."*	The NRA is provided in Volume 4, Annex 9.1 (application ref: 6.4.9.1).
	Paragraph 2.33.11 states *"Where there is a possibility that safety zones will be sought around offshore infrastructure,*	Potential impacts from safety zones have been considered for the construction phase (Section 9.10),

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	potential effects should be included in the assessment on navigation and shipping." Paragraph 2.33.12 states *"Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA and refer to the government guidance on safety zones."*	the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). Worst case assumptions have been made as per Section 9.8.
	Paragraph 2.33.13 states *"The potential effect on recreational craft, such as yachts, should be considered in any assessment."*	Potential impacts to recreational vessels have been considered for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
	Paragraph 2.33.20 states *"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."*	Relevant IMO routeing measures (i.e., the Liverpool Bay TSS) are considered relative to the array in Volume 4, Annex 9.1 (application ref: 6.4.9.1).

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
NPS for Ports (DfT, 2012)	Paragraph 5.14.2 states *"Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES."*	Impacts on port access and vessel routeing have been assessed from a navigational safety perspective in the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). Socioeconomic impacts are assessed separately in Volume 3, Chapter 3.3: Socioeconomics (application ref: 6.3.3).
	Paragraph 5.14.4 states "*Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.*"	Impacts on port access and vessel routeing have been assessed from a navigational safety perspective in the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
		Socioeconomic impacts are assessed separately in Volume 3, Chapter 3.3 (application ref: 6.3.3).
	Paragraph 5.14.5 states "*Socio-economic impacts may be linked to other impacts.*"	Consideration of how impacts (including Socioeconomic impacts) interact is provided in Volume 2, Chapter 14: Interrelationships (application ref: 6.2.14).

6 As of April 2021, the primary guidance required to be considered for an NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) undertaken for a United Kingdom (UK) Offshore Renewable Energy Installation (OREI) is Marine Guidance Note (MGN) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021).

7 On this basis, key guidance considered within this chapter and within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) is listed below:

- Marine Guidance Note (MGN) 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on United Kingdom (UK) Navigational Practice, Safety and Emergency Response (MCA, 2021) – highlights issues that need to be taken into consideration when assessing impacts related to navigational safety and emergency response (search and rescue (SAR), salvage and towing, and counter pollution) that may arise from OREI developments. Note: the annexes have also been considered.
- Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process (International Maritime Organization (IMO), 2018) – outlines the FSA methodology.
- Marine Guidance Note (MGN) 372 Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008) - highlights issues to be taken into account by third party mariners when planning and undertaking voyages in the vicinity of OREIs off the UK coast.
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation R139 on The Marking of Man-Made Offshore Structures (IALA, 2021) and Guidance G1162 on The Marking of Man-Made Offshore Structures (IALA, 2021) – provides recommendations and guidance for developers with regard to the marking of structures which may represent obstructions to navigation (including OREIs).
- **The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4)** – Wind Energy (Royal Yachting Association (RYA), 2019) – facilitates developers in taking account of recreational boating concerns.
- Standard Marking Schedule for Offshore Installations (Department of Energy & Climate Change DECC), 2011) *Now BEIS – outlines aids to navigation requirements for offshore installations.

9.3 Consultation and scoping

8 A summary of key points raised during consultation are given in Table 2, which includes reference to where each point is addressed within this chapter, the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) or wider ES. Further details of the consultation process including full details of all responses, meeting minutes, the regular operator outreach and hazard workshop are provided in the NRA.

9 Consultation undertaken of relevance to shipping and navigation includes the following:

- Scoping opinion;
- Responses to PEIR under Section 42;
- Regular operator outreach which is discussed in full in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1));
- The hazard workshop (a standard element of the NRA consultation process whereby a project is discussed with shipping and navigation stakeholders in a group "workshop" setting) which is discussed in full in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1));
- Direct stakeholder meetings / engagement; and
- Relevant aspects of the Evidence Plan (application ref: 8.2).

Table 2: Summary of consultation relating to shipping and navigation.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
Scoping Opinion, July 2020	The Isle of Man Government requested that impacts to the Isle of Man Steam Packet Company were fully considered, including any potential impacts on adverse weather routeing.	Impacts to commercial vessels (including adverse weather routeing) have been assessed for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). The Isle of Man Steam Packet Company has been consulted with as part of the regular operators consultation as summarised in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)). It is noted that the Isle of Man Steam Packet Company has confirmed it is content with the array boundaries via the Isle of Man Government under its Section 42 response.
	The MCA stated that potential impacts on navigational issues for both commercial and recreational craft should be considered.	Impacts to both commercial and recreational vessels have been assessed for the construction phase (Section 9.10),

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
	The MCA stated an NRA should be produced in line with MGN 543, and noted that an update to this document is expected.	The NRA is provided in Volume 2, Chapter 9, Annex 1 (application ref: 6.4.9.1), and is compliant with MGN 654 which superseded MGN 543 in April 2021. An MGN 654 checklist is provided in Appendix A of Volume 4, Annex 9.1.
	The MCA stated that careful consideration must be given to routeing in the vicinity, in particular any routes associated with the Liverpool Bay TSS.	Marine traffic data has been used to determine Main Routes of relevance to AyM including those associated with the Liverpool Bay TSS (see Section 9.7.3).
	The MCA require that consideration must be given to SAR access.	Full consideration will be given to MGN 654 SAR Annex 5 requirements around layout access, and it is anticipated that the agreement of the layout with the MCA will form a Marine Licence condition as

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4).
	The MCA stated consideration must be given to any effects of AyM on navigable depths.	Effects on under-keel clearance are considered in Section 9.11, and the MCA will be consulted on any changes in charted water depth of greater than 5% as per MGN 654.
	Trinity House required that comprehensive vessel traffic analysis be undertaken in accordance with MGN 543.	The marine traffic data collected complies with MGN 654 (which superseded MGN 543 in April 2021) as laid out within the NRA.
	Trinity House stated possible cumulative and in-combination effects on shipping routes and patterns should be adequately assessed.	Cumulative impacts are assessed in Section 9.13.
	Trinity House stated that proposed layouts should conform to MGN 543 and consideration should	Full consideration will be given to MGN 654 (which superseded MGN 543 in April 2021) SAR Annex 5 requirements around layout

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	be given to the layout of the current Gwynt y Môr Offshore Wind Farm (GyM) in this regard.	access, and the final layout will be agreed with the MCA and Trinity House.
	Trinity House stated that if any auxiliary structures (e.g., the met mast) lie outwith the actual wind farm turbine layout, then additional risk assessment should be undertaken.	As per Volume 2, Chapter 1: Offshore Project Description (application ref: 6.2.1), a met mast may be sited outside of the array, within the other wind farm infrastructure zone. Potential associated impacts are assessed for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
Meeting with UK Chamber of Shipping (CoS), 28/09/2020	Queried how it would be ensured that all relevant parties are invited to participate in consultation.	Full details of the consultation process are provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)).
Meeting With MCA and Trinity House, 02/10/2020	The obstruction of the Point Lynas Light (and any other aid to navigation) by the structures within the array should be considered.	Impacts on existing AtoN are considered within the NRA.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	Noted updates to MGN 543 were within a consultation phase.	As per Section 9.2, the NRA complies with the up-to-date guidance (MGN 654).
Email correspondence with RYA, 01/10/2020	Recommended that vessel traffic surveys are undertaken at peak recreational times with information indicating that this likely to be between mid-July and mid-August.	Vessel traffic survey methodology has been agreed with the MCA and Trinity House and is MGN 654 compliant as per the NRA. The data includes a summer 2021 survey.
	The RYA Coastal Atlas should be considered in full (including both the Automatic Identification System (AIS) density and boating area elements).	The RYA Coastal Atlas has been considered as per Section 9.4.2.
Section 42 Cruising Association	The Cruising Association stated no comment and that it was "content."	Noted.
Section 42 Trinity House	Early layout consultation should be undertaken with Trinity House noting AyM should not adversely affect the current lines of orientation at the operational GyM.	Preliminary consultation has already been undertaken with both MCA and Trinity House with regards to layout, and it is anticipated that the agreement of the

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		layout with the MCA and Trinity House will form a Marine Licence condition as outlined in Document 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4). Impacts on surface navigation and SAR have been assessed for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
Section 42 Isle of Man Government	Stated that the Isle of Man Steam Packet Company has indicated it is content with the current project coordinates.	Noted.
Section 42 CoS	The CoS recommended that the layout design should give due consideration to shipping and navigation, citing specifically the traffic associated with the anchorage in Dulas Bay/Point Lynas.	The final layout will be agreed with the MCA and Trinity House and these discussions will include due consideration of surface navigation.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		It is noted that as per the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), the western extent of the array has been removed since the Preliminary Environmental Information Report (PEIR), thus reducing potential for interaction with the referenced traffic.
	The CoS stated strong preference for two lines of orientation across the development, unless sufficient safety justification be made to the MCA. Further, consideration should be given to GyM in terms of space between the projects and consistent lines of orientation through both sites.	It is anticipated that the agreement of the layout with the MCA and Trinity House will form a Marine Licence condition as outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4). To inform this process, Framework Layout Commitments have been agreed with the MCA and Trinity House that include provision for limiting impact on the GyM lines of orientation. The Framework Layout

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		Commitments are presented in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)).
	CoS stated concern over the modelled position of the isolated Met Mast structure within the Other Infrastructure Zone, noting specifically the deviated traffic associated with Point Lynas. CoS recommended alternative locations be sought and the structure be contained within the array for safety of navigation.	As detailed in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) the Other Wind Farm Infrastructure Zone (OWFIZ) has been refined post PEIR to shift the potential Met Mast locations further from the Point Lynas traffic. The final position will be agreed with MCA and Trinity House.
	The CoS stated it should be considered that a drifting allision may result in higher consequences than a "low impact" contact, particularly in adverse weather conditions. The CoS stated consideration should also be given to potential for an unpowered drifting vessel, whilst taking into consideration charted cabling, to drop anchor for safety concerns and the potential for anchor snag or anchor drag leading to allision.	Consequences from potential allisions (including drifting) in terms of PLL and pollution are assessed in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)). Impact assessment of drifting risk has been undertaken for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). This includes

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		assessment of emergency anchoring in terms of potential cable interaction (Section 9.11).
	The CoS stated that near miss incidents have occurred around the UK between wind farm structures and commercial vessels which have experienced loss of power, leading to emergency anchoring, subsequent anchor drag, and rescue tug use to keep the vessel from alliding with the structure. Such incidents lead to ship operators incurring significant costs.	Drifting risk including consideration of emergency anchoring has been assessed for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12).
	The CoS stated implications for SAR capabilities in the area need careful consideration, and the Applicant should consider what organisational or financial assistance will be provided to MCA in provision of SAR.	Impacts on SAR have been assessed for the construction phase (Section 9.10), the operational phase (Section 9.11) and the decommissioning phase (Section 9.12). As per Section 9.9, the Applicant will comply with MGN 654 which includes a requirement to agree a SAR checklist with the MCA which sets out the relevant

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		mitigations that will be in place. It is noted that AyM will also increase resources including self-help capability in the event of a SAR incident. Associated cooperation procedures with the MCA will be agreed via the Emergency Response Cooperation Plan (ERCoP) (Section 9.9).
	The CoS stated view that the assessed frequency of certain impacts should be raised including powered and drifting allision risk and impacts on SAR responders.	The rankings assigned are based on various input including the baseline assessment, quantitative modelling, and level of stakeholder concern, and give due consideration to frequency of both realistic and worst-case consequences. The CoS view and input has been captured within the NRA process.
	The CoS stated supports for burial of interconnector and inter-array cabling wherever possible to minimise reduction of water depth and snagging risk. The CoS queried what	Necessary cable protection measures will be assessed and agreed as part of the Cable Burial Risk Assessment (CBRA), which will form part of a broader Cable

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	monitoring of the seabed and cable burial will be present post cable-laying, noting that for some developments around the UK, inter array cables in particular have become exposed within a short period.	Specification and Installation Plan (CSIP). This will include conditions in relation to monitoring procedures and interim mitigations in the event that cables become exposed.
	The CoS supports the application and use of safety zones during construction, decommissioning and periods of major maintenance for the safety of life. However, the application or use of safety zones for protection of property or assets is not supported.	The application for any safety zones applied for will include a safety case for their implementation that demonstrates how they will reduce risks to project vessels, personnel and third-party vessels and crews. It is noted that the Applicant does not intend to apply for permanent operational safety zones.

9.4 Scope and methodology

9.4.1 Study areas

10 The assessment has been undertaken within a study area defined as a minimum 10 NM buffer of the array, and a 5 NM buffer of the offshore Export Cable Corridor (ECC). The study area has been agreed with key stakeholders during preliminary consultation and has been designed to capture relevant passing traffic (including that associated with local ports and anchorage grounds) while still remaining site-specific to AyM. The study area is shown in Figure 1, noting that full details are provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)).

9.4.2 Baseline data

11 Table 3 presents the key data used to inform the NRA and the subsequent risk assessment within this Chapter.

Table 3: Key data sets for shipping and navigation.

DATA	SOURCE	SUMMARY
Vessel Traffic	12 months AIS data covering the entirety of 2019.	To establish a marine traffic baseline and identify any seasonal variations and effects due to COVID-19.
	28 days AIS, radar, and visual observation data collected during November/ December 2020 and July /August 2021.	To establish a marine traffic baseline including non-AIS traffic.
Marine Aggregate Dredger Routes	All passage plans from British Marine Aggregate Producers Association (BMAPA) (2021)	To establish the routes of marine aggregate dredgers.
Recreational Vessels	RYA Coastal Atlas (RYA, 2018)	To establish the recreational baseline.

DATA	SOURCE	SUMMARY
Maritime Incidents	Maritime Accident Investigation Branch (MAIB) marine accidents database (2010 to 2019).	To define the baseline incident rates within the study area relative to AyM.
	Royal National Lifeboat Institution (RNLI) incident data (2010 to 2019).	
	DfT United Kingdom (UK) civilian SAR helicopter taskings (2015 to 2020).	
Other Navigational Features	United Kingdom Hydrographic Office (UKHO) Admiralty Sailing Directions West Coasts of England and Wales Pilot NP37 (UKHO, 2017).	To establish the baseline in terms of navigational features.
	UKHO Admiralty Charts (UKHO, 2021).	
Weather	Awel y Môr Offshore Wind Farm, Metocean Hindcast Data Report (Project Number 26801580-01).	Wind and wave data.
	UKHO Admiralty Sailing Directions West Coasts of England and Wales Pilot NP37 (UKHO, 2017).	Visibility data.
	Admiralty Charts 1978 and 1826 (UKHO, 2021).	Tidal stream data.

9.4.3 Impact screening within NRA

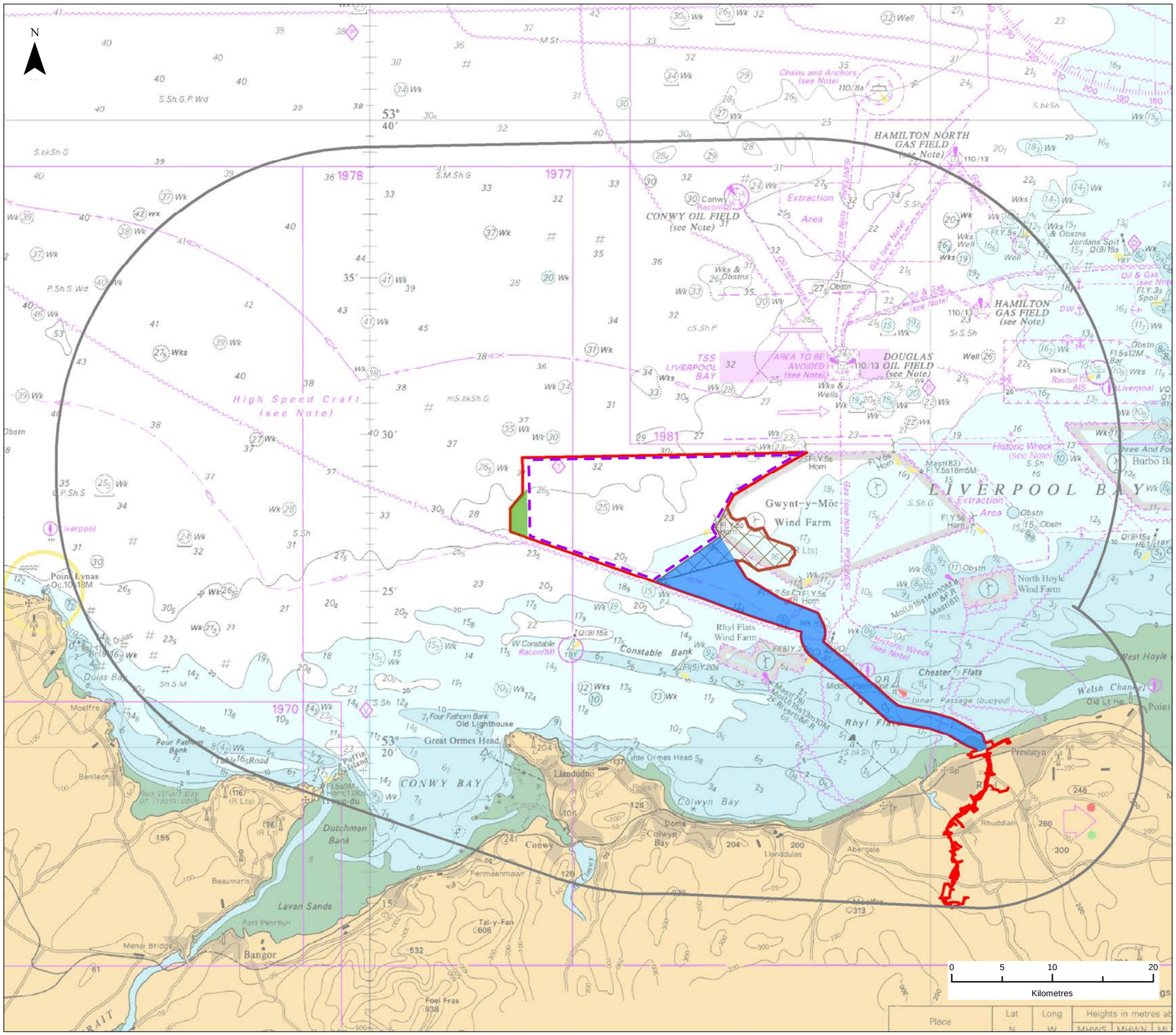
12 A screening process of impacts requiring assessment has been undertaken as part of the standard NRA process (Volume 4, Annex 9.1 (application ref: 6.4.9.1)). This process has considered the outputs of the Scoping Opinion alongside the subsequent consultation and assessment undertaken to determine the impacts which should be screened in for assessment within this chapter.

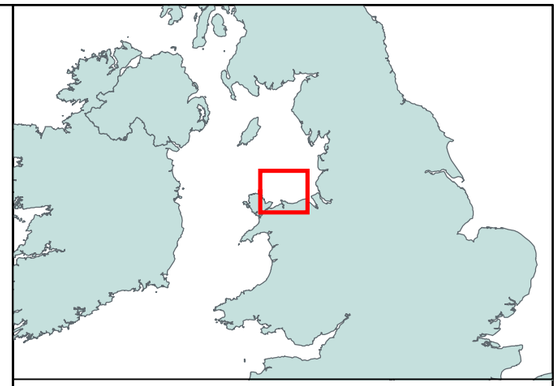
13 All impacts to shipping and navigation users identified as requiring assessment by the Secretary of State as per the Scoping Opinion have been captured and assessed within the NRA and Environmental Statement (ES) assessments. However, it is noted that certain impacts have been refined to ensure appropriate assessment in terms of effects in relation to navigational safety based on consultation feedback received post-scoping. Full details are provided in the NRA, with a summary of the relevant refinements as follows:

- "Traffic displacement" has been split into collision risk and adverse weather routeing elements;
- "Vessel to structure allision risk" has been split into separate powered allision and drifting allision elements ("Vessel to structure powered allision risk" and "Vessel to structure drifting allision risk); and
- "Vessel to structure powered allision risk", "Vessel to structure drifting allision risk" and "Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders" are assessed for all phases.

Impacts assessed within NRA

14 Impacts associated with *'interference with communications and position fixing equipment*' have been assessed within the NRA and it was determined that further assessment was not required.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Study Area

VER	DATE	REMARKS	Drawn	Checked
1	25/05/2021	For Issue	DS	AF
2	14/06/2021	Updated based on comments	DS	AF
3	04/03/2022	Updated GIS Layers	DS	AF

FIGURE NUMBER:

Figure 1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	World Mercator

Fferm Wynt Alltraeth AWEL Y MÔR Offshore Wind Farm

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9.5 Assessment criteria and assignment of significance

15 The overarching approach to the environmental impact assessment within the ES is detailed within Volume 1, Chapter 3: EIA Methodology (application ref: 6.1.3). However, as required under the MCA methodology detailed in Annex 1 of MGN 654 (MCA, 2021), the International Maritime Organization (IMO) FSA approach (IMO, 2018) is required to be used for assessment of impacts to shipping and navigation receptors. Therefore, the FSA is applied within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) and this chapter as opposed to the overarching methodology presented in Volume 1, Chapter 3 (application ref: 6.1.3). Discussion is provided in Section 9.5.1 to describe how the FSA rankings relate to those required under the overarching methodology.

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

17 The definitions for "Severity of Consequence" and "Frequency of Occurrence" are given in Table 4 and Table 5 respectively.

Table 4: Severity of consequence.

RANK	SEVERITY OF CONSEQUENCE	DEFINITION			
		PEOPLE	PROPERTY	ENVIRONMENT	BUSINESS
1	Negligible	No perceptible effect	No perceptible effect	No perceptible effect	No perceptible effect
2	Minor	Slight injury(s)	£10 k - £100 k	Tier 1 local assistance required	Minor reputation impact – limited to users
3	Moderate	Multiple moderate or single serious injury	£100 k - £1 M	Tier 2 limited external assistance required	Local reputation impacts
4	Serious	Serious injury or single fatality	£1 M - £10 M	Tier 2 regional assistance required	National reputation impacts
5	Major	More than one fatality	> £10 M	Tier 3 national assistance required	International reputation impacts

Table 5: Frequency of occurrence.

RANK	FREQUENCY	DEFINITION
1	Negligible	< 1 per 10,000 years
2	Extremely Unlikely	1 per 100-10,000 years
3	Remote	1 per 10-100 years
4	Reasonably Probable	1 per 1 -10 years
5	Frequent	> 1 per year

18 Assessment of the significance of potential impact is described in Table 6. As shown, each impact is determined to be of either broadly acceptable, tolerable, or unacceptable significance based on their assigned frequency and consequence. Under the FSA approach, any impacts deemed to be of unacceptable significance require additional mitigation to bring them to within tolerable and ALARP parameters.

Table 6: Matrix to determine effect significance.

		FREQUENCY OF OCCURRENCE				
		NEGLIGIBLE	EXTREMELY UNLIKELY	REMOTE	REASONABLY PROBABLE	FREQUENT
SEVERITY OF CONSEQUENCE	NEGLIGIBLE	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
	MINOR	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	MODERATE	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	SERIOUS	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	MAJOR	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

Note: Effects of 'unacceptable' significance are defined as significant with regards to the EIA Regulations.

9.5.1 FSA in relation to Overarching Assessment Methodology

19 The overarching assessment methodology presented in Volume 1, Chapter 3 (application ref: 6.1.3) requires the determination of the magnitude of effect and sensitivity of receptor for each impact assessed. Within the FSA approach, the magnitude of the impact is captured within the severity of consequence ranking (see Table 4). Sensitivity of receptors is captured within frequency of occurrence (see Table 5).

20 For the purposes of this assessment:

- Impacts that are deemed to be of unacceptable significance, or not within ALARP parameters, are considered to be significant in Environmental Impact Assessment (EIA) terms; and
- Impacts deemed to be broadly acceptable or tolerable and ALARP are not significant in EIA terms.

9.6 Uncertainty and technical difficulties encountered

9.6.1 Data sources

21 Limitations of the available marine traffic data associated with Automatic Identification System (AIS) carriage obligations, seasonal variation, and potential COVID effects on shipping are considered in detail within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)). The NRA also considers limitations of the navigational features assessment and maritime incident data.

9.6.2 Layout and other design parameters

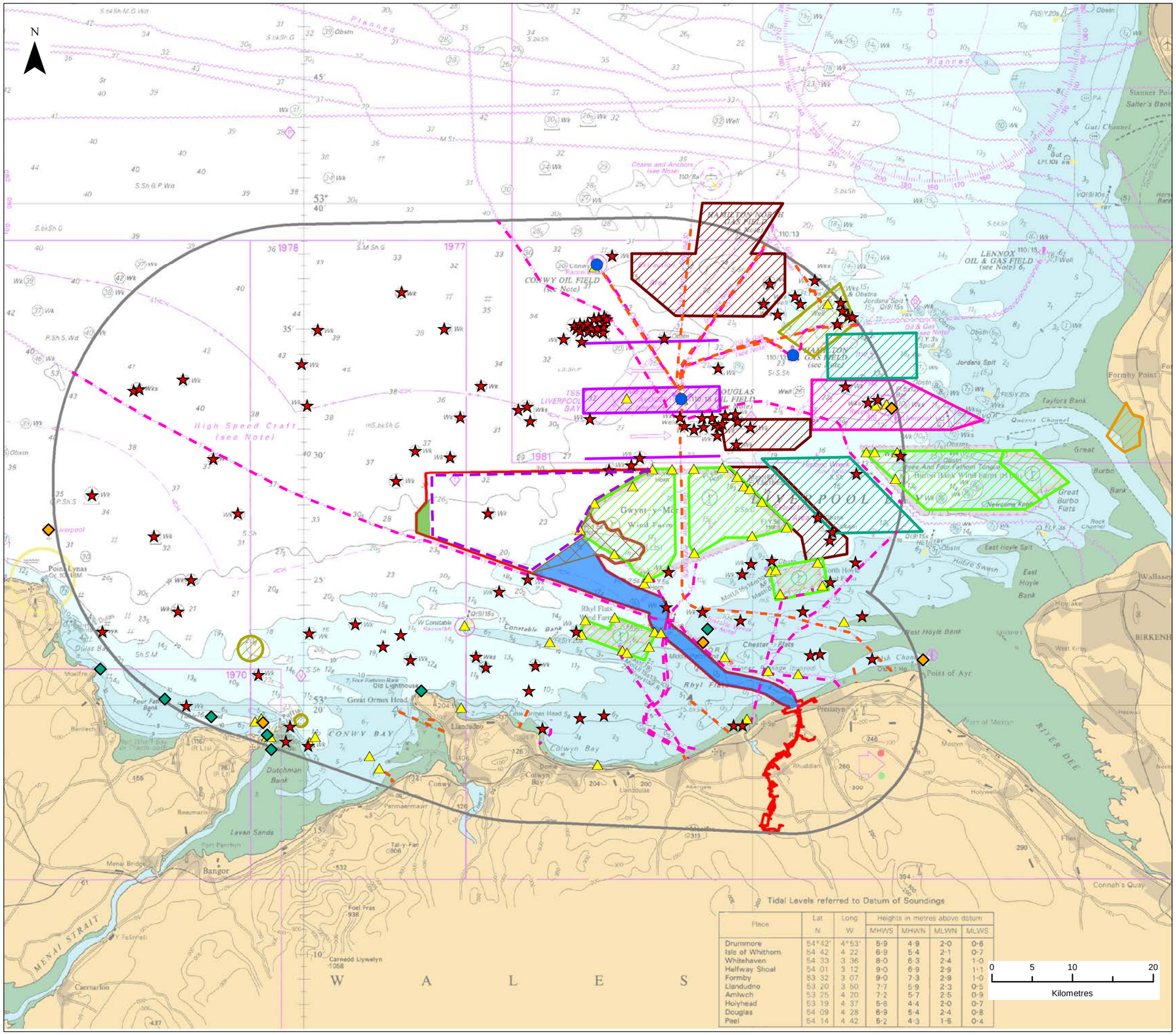
22 The shipping and navigation baseline and impact identification has been undertaken based upon the information available and responses received at the time of preparation. It has been assessed based upon a Maximum Design Scenario (MDS), in particular noting that the locations of structures will not be finalised until post-consent. This approach ensures that whatever is constructed will fall within the worst-case parameters already assessed.

9.7 Existing environment

23 Full details of the navigational features, maritime incidents, and marine traffic baseline assessments are provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)). A review of the key findings from that study has been incorporated into the description of the existing environment given below. It is not intended to repeat or to carry out any additional assessment over that undertaken within the NRA.

9.7.1 Navigational features

24 Figure 2 presents an overview of the existing environment within the vicinity of AyM in terms of navigational features.



LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Navigational Features

- Anchorage Area
- Extraction Area
- Firing Range
- No Anchorage Area
- Other Wind Farm
- Spoil Ground
- TSS
- Aid to Navigation
- Anchorage
- Oil and Gas Platforms
- Pilot Boarding Station
- Charted Wreck/Obstruction
- Cable
- Pipeline

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Navigational Features

VER	DATE	REMARKS	Drawn	Checked
1	25/05/2021	For Issue	DS	AF
2	14/06/2021	Updated based on comments	DS	AF
3	04/03/2022	Updated GIS Layers	DS	AF

FIGURE NUMBER:

Figure 2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:500,000	A3	WGS84	World Mercator

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25 The key navigational feature in the area is considered to be the Liverpool Bay Traffic Separation Scheme (TSS) IMO adopted routeing measure, given that it dictates the majority of vessel routeing in the area (see Section 9.7.3). The TSS is situated within the study area approximately 0.5 NM from the array area, noting that this separation is consistent with that of the neighbouring GyM array area.

26 There are four operational OWFs located within the study area, namely GyM (adjacent), Rhyl Flats (3 NM south east), North Hoyle (8 NM south east), and Burbo Bank Extension (9 NM east).

27 There are three oil and gas (O&G) platforms located within the study area, with the closest being the Douglas oil platform, located 7.5 NM to the north east.

28 A total of 13 submarine cables are located within the study area including interconnector cables, wind farm export cables, and cables associated with the nearby O&G infrastructure. Four of these cables intersect the offshore ECC.

29 Two production agreement marine aggregate dredging areas are present within the study area, namely Hilbre Swash (area number 393) located 3.0 NM east, and Liverpool Bay (area number 457), located 6.1 NM north east. Liverpool Bay (area number 1808) is an exploration and option area located 3.0 NM to the east.

30 A total of 120 charted wrecks are present within the study area with a high concentration located within or near the Liverpool Bay TSS. Two charted wrecks are located within the array area itself. Further details of wrecks including non-charted wrecks are provided in Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage (application ref: 6.2.11).

31 The busiest nearby port is Liverpool which has between 6,000 and 7,000 vessel arrivals per year. Five pilot boarding stations associated with nearby ports are located within the vicinity of the array area, including those associated with Liverpool and Mostyn.

32 Two charted anchorage areas are located to the east / north east of the array area associated with the Port of Liverpool, noting that a 'no anchorage' area is located between these anchorages to allow access to the local ports. Additional preferred anchorage areas are also present, including one in proximity to the offshore ECC off the coast of Rhyl. Commercial vessels are also known to anchor off Point Lynas at Moelfre Road in the vicinity of the Point Lynas pilot boarding area.

9.7.2 Maritime incidents

33 Maritime Accident Investigation Branch (MAIB), Royal National Lifeboat Institute (RNLI), and SAR helicopter taskings data has been reviewed within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) to establish the maritime incident history within the study area and offshore ECC.

34 A total of 45 incidents were recorded by the MAIB between 2010 and 2019 within the study area corresponding to an average of five incidents per year. One of these incidents, a machinery failure of an O&G related vessel in 2012 occurred within the array area, however no incidents were recorded within the offshore ECC. The majority of the incidents were "Accident to Person" and "Machinery Failure".

35 A total of 1,150 incidents were recorded by the RNLI between 2010 and 2019 within the study area corresponding to an average of 115 incidents per year, noting the majority of these incidents occurred within coastal regions. Five of these incidents occurred within the array area, and 22 incidents occurred within the offshore ECC. The majority of the incidents were "person in danger". The majority of vessel types / people involved were recreational vessels and person in danger.

36 A total of 96 SAR helicopter taskings were undertaken between April 2015 and March 2020 within the study area corresponding to an average of 19 taskings per year. No incidents occurred within the array area or offshore ECC.

9.7.3 Vessel traffic

37 The main vessel types recorded in the 2020/2021 survey data within the study area were cargo vessels, tankers, and wind farm vessels. Fishing vessels, marine aggregate dredgers, tugs, passenger vessels, recreational vessels, and oil & gas vessels were also recorded. The winter 2020 survey data is shown colour coded by vessel type in Figure 3, with the summer 2021 survey data colour coded by vessels type in Figure 4.

38 As per Section 9.4.2, a year of 2019 AIS data has also been considered. This data is assessed in full within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1), Appendix B), noting the summary there is considered to be in broad correlation with the 2020/2021 survey data. The 2019 data is shown in Figure 5 for reference.

39 The majority of the commercial vessels (i.e. cargo, tanker and passenger) were observed to be on routes associated with the Liverpool Bay TSS. The majority of commercial vessels not using the TSS were observed to be associated with commercial ferry routes between Liverpool and Belfast. Cargo vessels and tankers were also recorded at anchor off Point Lynas and within the charted anchorage areas associated with Liverpool.

40 The majority of wind farm vessels recorded were observed to be associated with the operational GyM project, and mobilising from Mostyn to the south.

41 Marine aggregate dredgers were recorded transiting to the nearby extraction areas (see Section 9.7.1). No British Marine Aggregate Producers Association (BMAPA) passage plans pass through the array, however one does intersect the offshore ECC.

42 O&G vessels were recorded in proximity to the O&G platforms present within the north of the study area.

43 Fishing vessels were recorded both in transit and actively engaged in fishing within the study area. The active fishing activity was primarily recorded to the west of the array area, with activity within the array area itself observed to be from vessels in transit based on their speed/ behaviour.

44 A limited number of recreational vessels were recorded within the study area during the winter 2020 survey period, with an increase in recreational vessels recorded during the summer 2021 survey period including within the array area. It is noted that the long-term data annex and other recreational data sources indicate that the majority of recreational activity is coastal throughout the year. The RYA Coastal Atlas (RYA, 2018) indicates activity in the vicinity of the offshore ECC landfall area, however this activity is not reflected in the other more recent marine traffic data. It is considered likely that this change is resultant of the operational wind farms in the area (notably GyM).

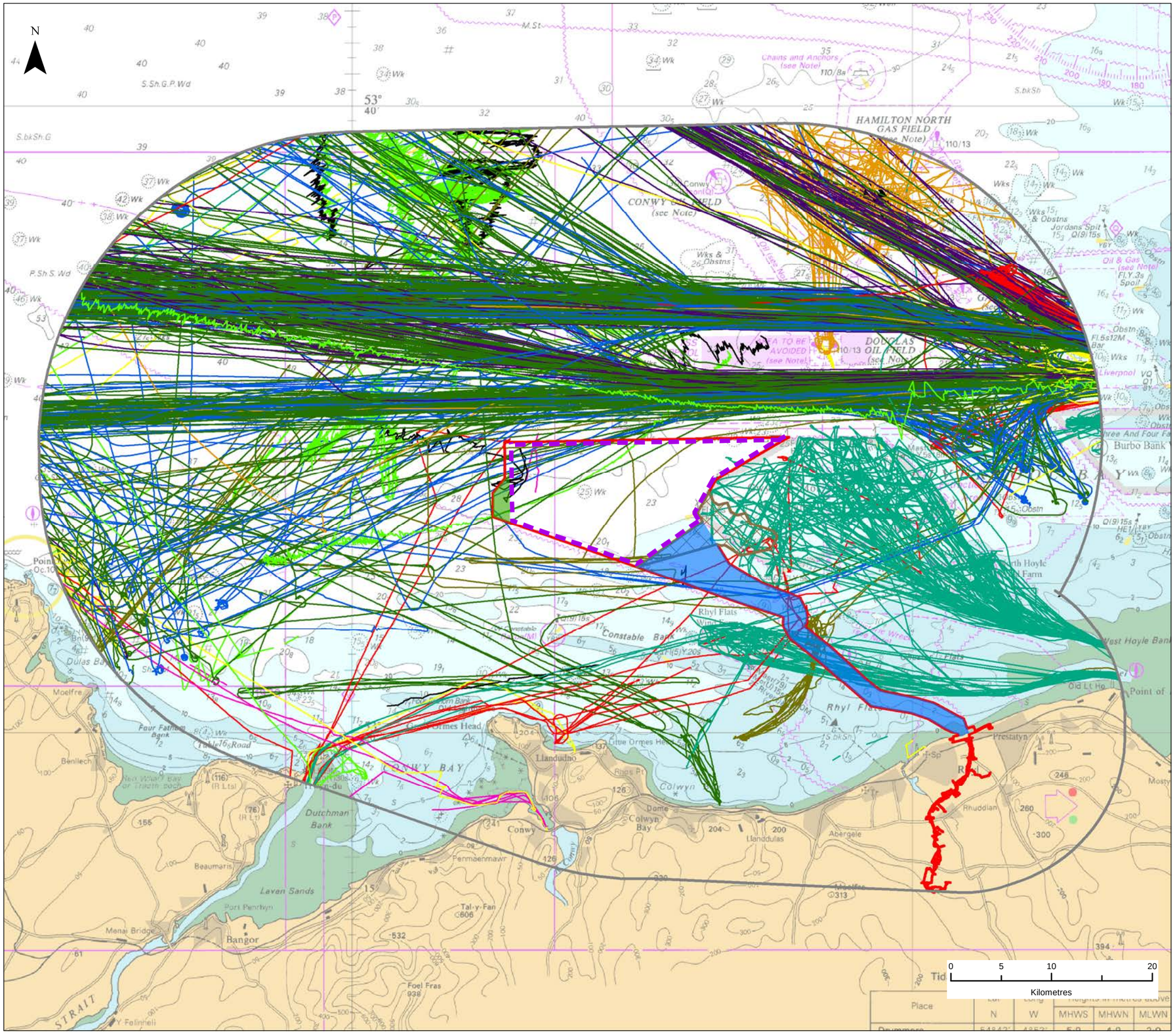
45 A total of 17 main routes have been identified from the available data sources, as shown in Figure 6. Following this, Table 7 presents details of each of these routes. Further details around the methodology behind how main routes are defined is provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)).

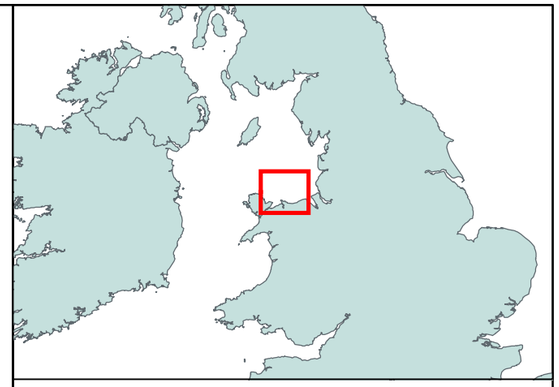
Table 7: Main route summary.

ROUTE	KEY TERMINUS / ORIGIN PORTS	VESSELS PER DAY	SUMMARY
1	Liverpool > Dublin	10	Uses outbound lane of Liverpool Bay TSS.
2	Dublin > Liverpool	8	Uses inbound lane of Liverpool Bay TSS.
3	Dublin > Liverpool	5	Uses inbound lane of Liverpool Bay TSS.
4	Liverpool > Dublin	2	Uses outbound lane of Liverpool Bay TSS.
5	Mostyn / GyM	2	Operational wind farm traffic associated with GyM.

ROUTE	KEY TERMINUS / ORIGIN PORTS	VESSELS PER DAY	SUMMARY
6	Liverpool > Belfast	2	Uses outbound lane of Liverpool Bay TSS.
7	Belfast > Liverpool	2	Uses inbound lane of Liverpool Bay TSS.
8	Liverpool / Belfast	1	Traffic accessing / departing Liverpool, passes inshore of TSS.
9	Point Lynas > Liverpool	1	Vessels accessing outbound lane of Liverpool Bay TSS from off Point Lynas.
10	Liverpool / Belfast	1	Traffic accessing / departing Liverpool, passes inshore of TSS.
11	Point Lynas	1	Route to / from anchoring area off Point Lynas.
12	Liverpool > Point Lynas	< 1	Vessels accessing area off Point Lynas from outbound lane of Liverpool Bay TSS.
13	Mostyn / Rhyl Flats	< 1	Operational wind farm traffic associated with Rhyl Flats.
14	Mostyn / North Hoyle	< 1	Operational wind farm traffic associated with North Hoyle.
15	Holyhead > Liverpool	< 1	Uses inbound lane of Liverpool Bay TSS.
16	Belfast > Liverpool	< 1	Vessel accessing Liverpool inshore of TSS.

ROUTE	KEY TERMINUS / ORIGIN PORTS	VESSELS PER DAY	SUMMARY
17	Heysham / Douglas Platform	< 1	O&G traffic associated with Douglas platform.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Vessel Type

- Unspecified
- Fishing
- Dredger
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Winter Survey Data 2020 (14 Days)

VER	DATE	REMARKS	Drawn	Checked
1	25/05/2021	For Issue	DS	AF
2	14/06/2021	Updated based on comments	DS	AF
2	04/03/2022	Updated GIS Layers	DS	AF

FIGURE NUMBER:

Figure 3

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	World Mercator

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AWEL Y MÔR Offshore Wind Farm

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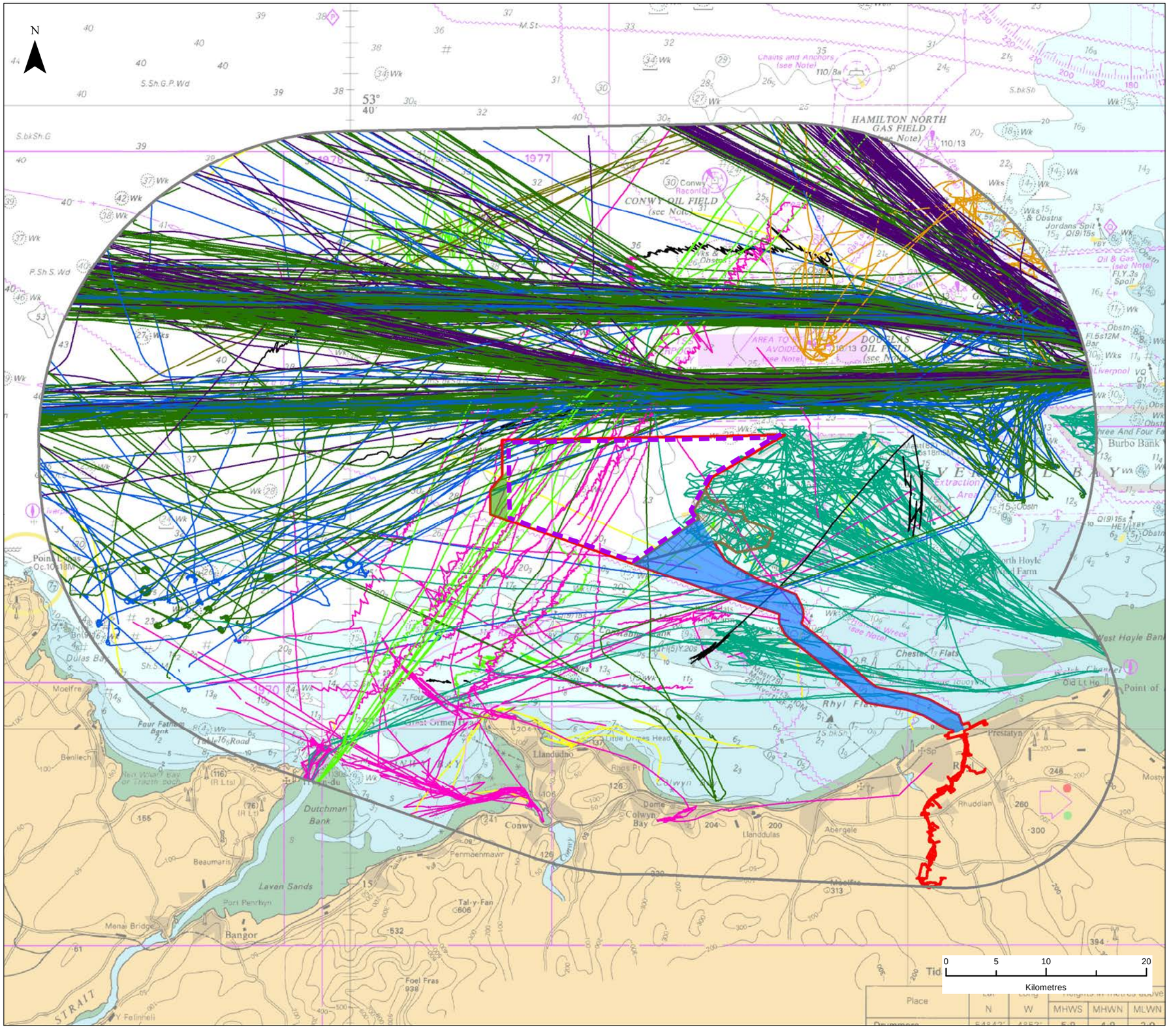

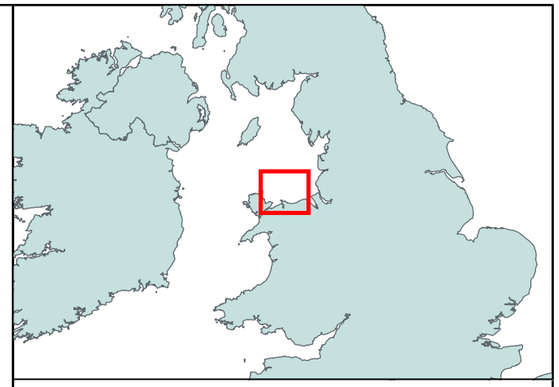

LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Vessel Type

- Unspecified
- Fishing
- Dredger
- HSC
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE: Summer Survey Data 2021 (14 Days)

VER	DATE	REMARKS	Drawn	Checked
1	04/03/2022	For Issue	DS	AF

FIGURE NUMBER:

Figure 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	World Mercator

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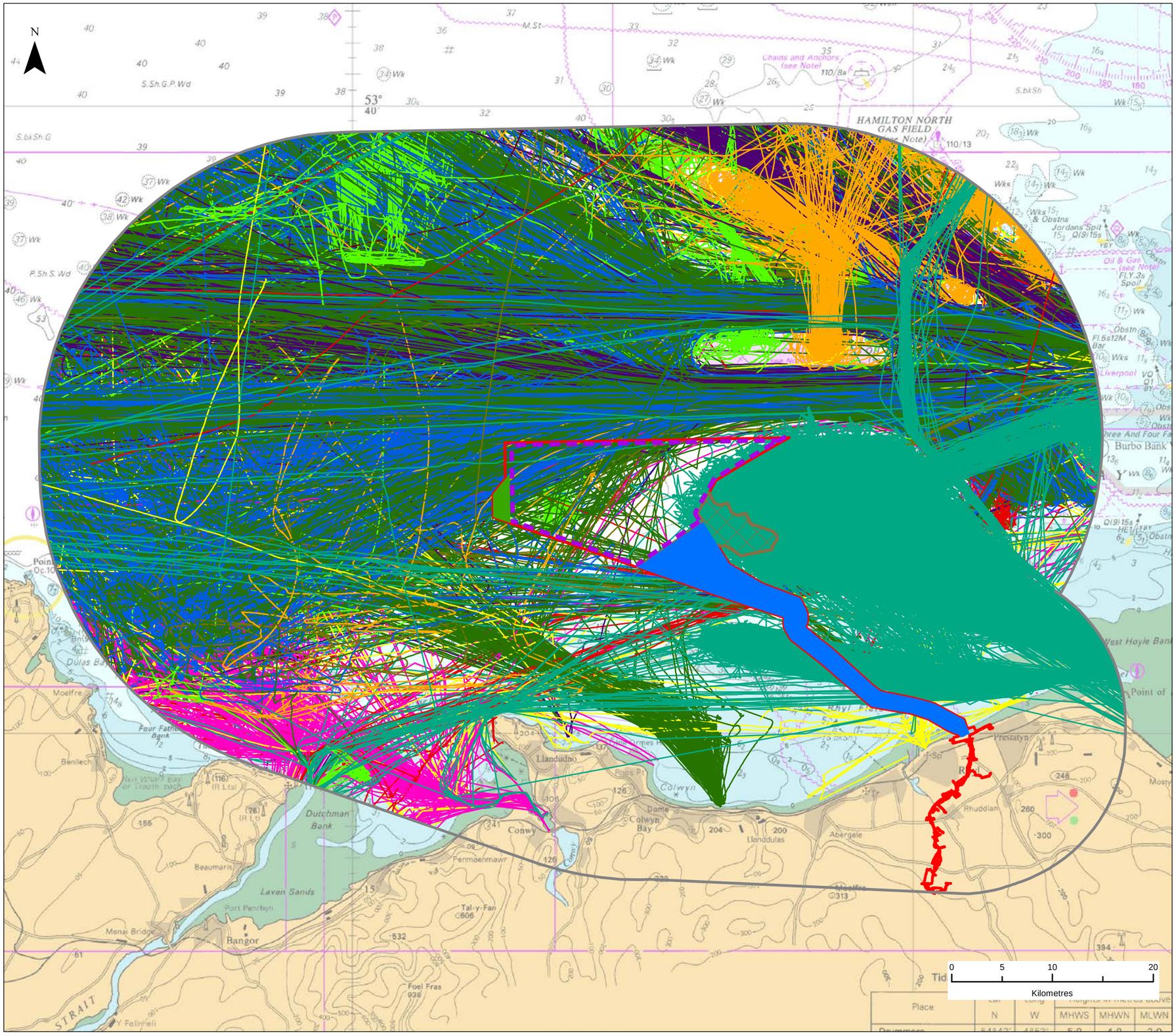

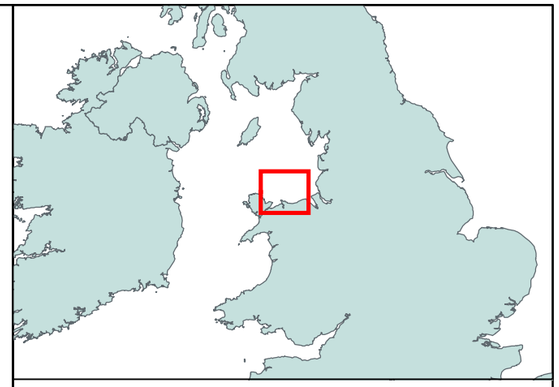

LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Vessel Type

- Fishing
- Military
- Dredger
- HSC
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Long Term AIS Data 2019

VER	DATE	REMARKS	Drawn	Checked
1	25/05/2021	For Issue	DS	AF
2	14/06/2021	Updated based on comments	DS	AF
2	04/03/2022	Updated GIS Layers	DS	AF

FIGURE NUMBER:

Figure 5

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	World Mercator

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AWEL Y MÔR
Offshore Wind Farm

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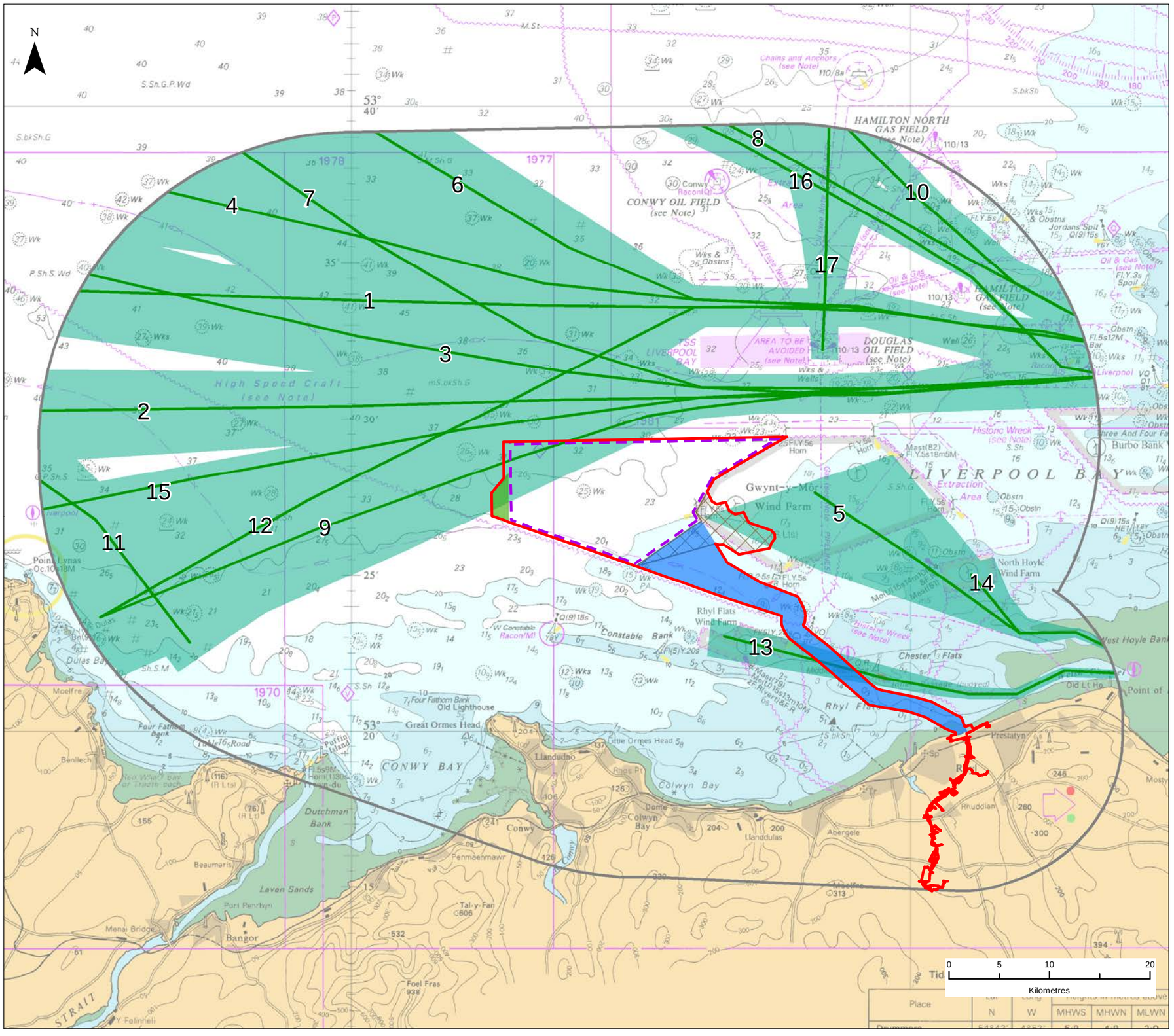

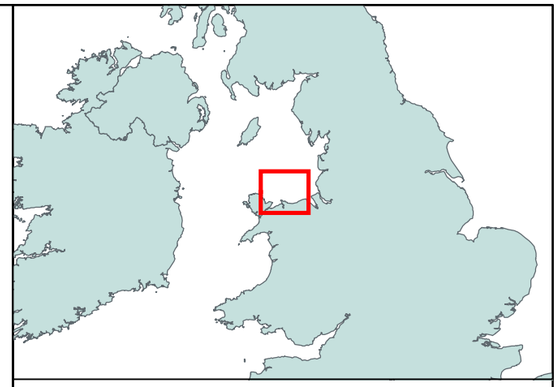

LEGEND

- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Study Area
- GyM Interlink Zone
- Order Limits

Vessel Routeing

- Main Route
- 90th Percentile

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Main Routes

VER	DATE	REMARKS	Drawn	Checked
1	25/05/2021	For Issue	DS	AF
2	14/06/2021	Updated based on comments	DS	AF
3	04/03/2022	Updated GIS Layers	DS	AF

FIGURE NUMBER:

Figure 6

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	World Mercator

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9.7.4 Evolution of the baseline

46 Future traffic levels are dependent on market conditions, and fluctuations are therefore difficult to predict, however the current accepted trend is that vessel size will increase, as per a study undertaken by the International Transport Forum (ITF) at the Organisation for Economic Cooperation and Development (OECD) on the impact of 'Mega Ships' (OECD / ITF, 2015).

47 In terms of commercial vessel routeing, no significant changes to the existing routes are likely, noting that current routes are largely dictated by the TSS. However, it is noted that the potential for a new P&O ferry route between Mostyn and Dublin that would pass south of the array area was raised during consultation (see the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1))).

48 The installation of offshore wind farms in the UK and Ireland is set to continue and there are a number of projects at varying stages of development with further projects expected to meet the target of 40 GW OWF capacity by 2030. Therefore, further OWF installations are expected within the Irish Sea over the lifetime of the project, noting that this will lead to increased wind farm vessel traffic.

49 No indication was made during consultation that any significant changes to recreational vessel volumes or behaviours will occur. Fishing vessel trends are discussed and considered further in Volume 2, Chapter 8: Commercial Fisheries (application ref: 6.2.8).

9.8 Key parameters for assessment

50 As per Section 9.6.2, noting uncertainty over as-built parameters, an MDS approach has been undertaken.

51 From a shipping and navigation perspective, the worst-case design is considered to be the maximum number of structures (including on the periphery of the array) over the largest possible area (i.e. full site build-out). On this basis, Table 8 describes the parameters upon which the impact assessment of significance effects for shipping and navigation has been undertaken.

Table 8: Maximum design scenario.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
CONSTRUCTION		
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures.	▲ Buoyed construction area around the maximum extent of the array; ▲ 50 pre-commissioned Wind Turbine Generators (WTGs), two Offshore Substation Platforms (OSPs), one Met Mast; ▲ Minimum spacing of 830 m; ▲ Construction phase of up to five years; ▲ 500 m safety zones around structures where active construction is ongoing, 50 m safety zones otherwise.	Largest area over longest construction phase will maximize displacement.
Restriction of adverse weather routeing.	▲ Buoyed construction area around the maximum extent of the array; ▲ 50 pre-commissioned WTGs, two OSPs, one Met Mast; ▲ Minimum spacing of 830 m; ▲ Construction phase of up to five years; ▲ 500 m safety zones around structures where active construction is ongoing, 50 m safety zones otherwise.	Largest area over longest construction phase will maximize displacement.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel.	▲ 50 pre-commissioned WTGs, two OSPs, one Met Mast; ▲ Up to 3,436 round trips from construction vessels; ▲ Peak of 101 construction vessels; ▲ Up to 124 km of inter array cables; ▲ Up to 79.34 km of offshore export cable; and ▲ Construction phase of up to five years.	Maximum potential site infrastructure will lead to maximum construction vessel presence in the area, leading to maximum collision risk.
Vessel-to-structure powered allision risk	▲ Full site build-out; ▲ 50 pre-commissioned WTGs, two OSPs, one Met Mast; ▲ WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); ▲ OSP topside dimensions of 80 x 50 m; ▲ Met Mast of diameter 5 m at sea level; ▲ Minimum spacing of 830 m; and ▲ Construction phase of up to five years.	Maximum number of structures over widest area assuming maximum dimensions at sea level will maximize allision risk.
Vessel-to-structure drifting allision risk	▲ Full site build-out; ▲ 50 pre-commissioned WTGs, two OSPs, one Met Mast;	Maximum number of structures over widest area assuming maximum dimensions at sea level will maximize allision risk.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	▲ WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); ▲ OSP topside dimensions of 80 x 50 m; ▲ Met Mast of diameter 5 m at sea level; ▲ Minimum spacing of 830 m; and ▲ Construction phase of up to five years.	
Reduced access to local ports	▲ Buoyed construction area; ▲ Up to 3,436 round trips from construction vessels; ▲ Up to 124 km of inter array cables; ▲ Up to 79.34 km of offshore export cable; and ▲ Construction phase of up to five years.	Maximum potential site infrastructure will lead to maximum construction vessel presence in the area, leading to maximum potential for port access impacts.
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders.	▲ 50 pre-commissioned WTGs, two OSPs, one Met Mast; ▲ Up to 3,436 round trips from construction vessels; ▲ Peak of 101 construction vessels; ▲ Minimum spacing of 830 m; ▲ Up to 124 km of inter array cables; ▲ Up to 79.34 km of offshore export cable; and ▲ Construction phase of up to five years.	Maximum potential infrastructure and project vessels will lead to maximum number of on-site personnel, therefore maximizing potential to increase baseline incident rates.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
OPERATION		
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures.	▲ Full site build-out; ▲ 50 WTGs, two OSPs, one Met Mast; ▲ Minimum spacing of 830 m; ▲ Operational life of up to 25 years; and ▲ 500 m safety zones around structures where major maintenance is ongoing.	Largest area over longest operational life will maximize displacement.
Restriction of adverse weather routeing	▲ Full site build-out; ▲ 50 WTGs, two OSPs, one Met Mast; ▲ Minimum spacing of 830 m; ▲ Operational life of up to 25 years; and ▲ 500 m safety zones around structures where major maintenance is ongoing.	Largest area over longest operational life will maximize displacement.
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel.	▲ 50 WTGs, two OSPs, one Met Mast; ▲ Up to 1,208 return vessel trips to site annually from project vessels; ▲ Peak of 22 project vessels; ▲ Up to 124 km of inter array cables; ▲ Up to 79.34 km of offshore export cable; ▲ Up to 10 km of GyM interlink cable; and	Maximum potential site infrastructure will lead to maximum project vessel presence in the area, leading to maximum collision risk.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	• Operational life of up to 25 years.	
Vessel-to-structure powered allision risk	• Full site build-out; • 50 WTGs, two OSPs, one Met Mast; • WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); • OSP topside dimensions of 80 x 50 m; • Met Mast of diameter 5 m at sea level; • Minimum spacing of 830 m; and • Operational life of up to 25 years.	Maximum number of structures over widest area assuming maximum dimensions at sea level will maximize allision risk.
Vessel-to-structure drifting allision risk	• Full site build-out; • 50 WTGs, two OSPs, one Met Mast; • WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); • OSP topside dimensions of 80 x 50 m; • Met Mast of diameter 5 m at sea level; • Minimum spacing of 830 m; and • Operational life of up to 25 years.	Maximum number of structures over widest area assuming maximum dimensions at sea level will maximize allision risk.
Reduced access to local ports	• 50 WTGs, two OSPs, one Met Mast; • Up to 1,208 return vessel trips to site annually from project vessels; • Up to 124 km of inter array cables;	Maximum potential site infrastructure will lead to maximum project vessel presence

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	• Up to 79.34 km of offshore export cable; • Up to 10 km of GyM interlink cable; and • Operational life of up to 25 years.	in the area, leading to maximum potential for port access impacts.
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders.	• 50 WTGs, two OSPs, one Met Mast; • Up to 1,208 return vessel trips to site annually from project vessels; • Peak of 22 project vessels; • Minimum spacing of 830 m; • Up to 124 km of inter array cables; • Up to 79.34 km of offshore export cable; • Up to 10 km of GyM interlink cable; and • Layout maintaining a Single Line of Orientation; and • Operational life of up to 25 years.	Maximum potential infrastructure and project vessels will lead to maximum number of on-site personnel, therefore maximizing potential to increase baseline incident rates.
Anchor interaction with subsea cables	• Up to 124 km of inter array cables; • Up to 79.34 km of offshore export cable; • Up to 10 km of GyM interlink cable; • Target burial depths of between 0.5 and 4 m • Potential for limited burial in areas of rock or cable crossings, use of external protection as identified via CBRA; and	Maximum length of subsea cable will maximize potential for anchor interaction.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	• Operational life of up to 25 years.	
Reduction of under-keel clearance resultant of cable protection	• Up to 124 km of inter array cables; • Up to 79.34 km of offshore export cable; • Up to 10 km of GyM interlink cable; • Potential for limited burial in areas of rock or cable crossings, use of external protection as identified via CBRA; and • Operational life of up to 25 years.	Maximum length of subsea cable will maximize potential for the need for additional external protection.
DECOMMISSIONING		
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures.	• Buoyed decommissioning area around the maximum extent of the array; • 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast; • Minimum spacing of 830 m; • Decommissioning phase of up to three years; and • 500 m safety zones around structures where active decommissioning is ongoing.	Largest area over longest decommissioning phase will maximize displacement.

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
Restriction of adverse weather routeing	• Buoyed decommissioning area around the maximum extent of the array; • 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast; • Minimum spacing of 830 m; • Decommissioning phase of up to three years; and • 500 m safety zones around structures where active decommissioning is ongoing.	Largest area over longest decommissioning phase will maximize displacement.
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel.	• 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast; • Up to 124 km of inter array cables left in situ; • Up to 79.34 km of offshore export cable left in situ; • Up to 10 km of GyM interlink cable left in situ; and • Decommissioning phase of up to three years.	Maximum potential site infrastructure will lead to maximum decommissioning vessel presence in the area, leading to maximum collision risk.
Vessel-to-structure powered allision risk	• Full site build-out; • 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast;	Maximum number of structures over widest area assuming

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	▲ WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); ▲ OSP topside dimensions of 80 x 50 m; ▲ Met Mast of diameter 5 m at sea level; ▲ Minimum spacing of 830 m; and ▲ Decommissioning phase of up to three years.	maximum dimensions at sea level will maximize allision risk.
Vessel-to-structure drifting allision risk	▲ Full site build-out; ▲ 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast; ▲ WTGs on multileg jackets (28.5 x 28.5 m at sea surface level); ▲ OSP topside dimensions of 80 x 50 m; ▲ Met Mast of diameter 5 m at sea level; ▲ Minimum spacing of 830 m; and ▲ Decommissioning phase of up to three years.	Maximum number of structures over widest area assuming maximum dimensions at sea level will maximize allision risk.
Reduced access to local ports	▲ Buoyed decommissioning area around the maximum extent of the array; ▲ Up to 124 km of inter array cables; ▲ Up to 79.34 km of offshore export cable; ▲ Up to 10 km of GyM interlink cable; and	Maximum potential site infrastructure will lead to maximum decommissioning vessel presence in the area,

POTENTIAL EFFECT	MAXIMUM ADVERSE SCENARIO ASSESSED	JUSTIFICATION
	• Decommissioning phase of up to three years.	leading to maximum potential for port access impacts.
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders.	• 50 partially decommissioned WTGs, two partially decommissioned OSPs, one partially decommissioned Met Mast; • Minimum spacing of 830 m; • Up to 124 km of inter array cables left in situ; • Up to 79.34 km of offshore export cable left in situ; • Up to 10 km of GyM interlink cable left in situ; and • Decommissioning phase of up to three years.	Maximum potential infrastructure and project vessels will lead to maximum number of on-site personnel, therefore maximizing potential to increase baseline incident rates.
CUMULATIVE EFFECTS		
The MDS associated with cumulative effects is provided in Table 11.		

9.9 Mitigation measures

52 Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) and deemed of relevance to Shipping and Navigation are listed in Table 9. The mitigation includes embedded measures such as design changes and applied mitigation which is subject to further study or approval of details; these include avoidance measures that will be informed by pre-construction surveys, and necessary additional consents where relevant. The composite of embedded and applied mitigation measures apply to all parts of the AyM development works, including pre-construction, construction, O&M and decommissioning.'

53 General mitigation measures, which would apply to all parts of the project, are set out first. Thereafter mitigation measures that would apply specifically to Shipping and Navigation issues associated with the array, offshore ECC, and landfall, are described separately.

54 Details as to how each mitigation is secured is provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)).

55 Where the FSA identifies the need for additional mitigation (see Section 9.5), this is clearly stated for the relevant impacts in Sections 9.10, 9.11, and 9.12.

Table 9: Mitigation relating to shipping and navigation.

PARAMETER	MITIGATION MEASURES
GENERAL	
MGN 654 Compliance	As required, the AyM project will comply with MGN 654 and its annexes.
CBRA, as part of a broader CSIP	Development of, and adherence to, a CSIP post consent. The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed to mitigate environmental

PARAMETER	MITIGATION MEASURES
	effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed CBRA to enable informed judgements regarding burial depth to maximise the chance of cables remaining buried whilst limiting the amount of sediment disturbance to that which is necessary. The CSIP is anticipated to be secured as a Marine Licence condition.
Marine Pollution Contingency Plan as part of a broader Project Environmental Management Plan (PEMP)	A Project Environment Management Plan (PEMP) is proposed to be produced to ensure that the potential for contaminant release is strictly controlled. The PEMP will include a Marine Pollution Contingency Plan (MPCP) and will also incorporate plans to cover accidental spills, potential contaminant release and include key emergency contact details. Typical measures will include: only using chemicals approved under the Offshore Chemicals Regulations 2002; storage of all chemicals in secure designated areas with impermeable bunding (generally to 110% of the volume); and double skinning of pipes and tanks containing hazardous materials. It will also include key emergency contact details (e.g. Natural Resources Wales (NRW), MCA, and the project site co-ordinator). The PEMP will be secured as a condition in the Marine Licence.
ERCoP	Production of an ERCoP in agreement with the MCA. This will include discussion and agreement with the MCA on appropriate communication procedures.
CONSTRUCTION	

PARAMETER	MITIGATION MEASURES
Appropriate marking on Admiralty charts	Details of AyM will be provided to the UKHO in advance of construction to ensure the buoyed construction area is displayed on nautical charts.
Promulgation of information	Details of AyM will be promulgated in advance of, and during construction via the usual means (e.g., Notice to Mariners, Kingfisher bulletin) to ensure mariners are aware of the ongoing works.
Buoyed construction area	Marking of the array as a buoyed construction area as directed by Trinity House.
Application for safety zones	Application for construction safety zones to be submitted to BEIS.
Marine coordination	Marine coordination and communication to manage project vessel movements. This will include project vessel procedures including promulgation of defined indicative project vessel transit routes to site.
Temporary lighting and marking	Temporary marking and lighting of the array in agreement with Trinity House and in line with IALA R139/G1162 during the construction phase.
Guard vessels	Use of guard vessels where identified as necessary via risk assessment.
OPERATION	
Appropriate marking on Admiralty charts	Details of AyM will be provided to the UKHO to ensure the associated infrastructure (including cables) are displayed on nautical charts.
Promulgation of information	Details of any major maintenance associated with AyM will be promulgated via the usual means (e.g., Notice to Mariners, Kingfisher bulletin) to ensure mariners are aware of the ongoing works.

PARAMETER	MITIGATION MEASURES
Application for safety zones	Application for major maintenance safety zones to be submitted to BEIS.
Ongoing consultation with regard to layout design	The final layout will be approved following discussion and agreement with MCA and Trinity House.
Lighting and marking	Lighting and marking of the array in agreement with Trinity House and in line with IALA R139/G1162.
Blade clearance	Blade clearance of at least 22 m above Mean High Water Springs (MHWS) (in line with RYA Requirements) to ensure potential for recreational mast interaction with the blades is minimized.
Guard vessels	Use of guard vessels where identified as necessary via risk assessment.
Framework Layout Commitments	Parameters within which the final layout will be defined will be agreed with the MCA and Trinity House to ensure suitable SAR and surface navigation access.
DECOMMISSIONING	
As the decommissioning phase will be a similar process to the construction phase but in reverse (i.e., increased project vessels on-site, partially deconstructed structures) the mitigation measures are expected to be similar to those for the construction phase.	

9.10 Environmental assessment: construction phase

9.10.1 Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures

56 The presence of the buoyed construction area may lead to third-party vessel displacement / deviations, which could lead to increases in encounters and hence increased vessel-to-vessel collision risk.

Commercial vessels

57 The routeing assessment within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) identified that two of the 17 main routes are likely to require temporary deviation as a result of the buoyed construction area. These are as follows:

- Route 9: used by approximately one vessel per day and running from Point Lynas to the inbound lane of the Liverpool Bay TSS; and
- Route 15: used by less than one vessel per day and running from the outbound lane of the Liverpool Bay TSS to Holyhead.

58 Route 9 is predicted to increase in distance by approximately 0.5 NM, while the increase for Route 15 is estimated to be less than 0.1 NM based on the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) post-wind farm routeing assessment. These findings align with consultation outputs of both the regular operator outreach and the hazard workshop in that consultees did not consider the anticipated deviations likely to be significant.

59 Details of AyM would be promulgated (including display on nautical charts) to ensure passing commercial vessels are able to effectively passage plan in advance accounting for the buoyed construction area, limiting any disruption.

60 Given limited change in route distances, there is not anticipated to be a notable associated change in collision risk arising from commercial vessel deviations.

Recreational vessels

61 Based on the available data sources and consultation, the highest density areas of recreational traffic in the area are coastal, however transits through the array area were still recorded during the summer survey.

62 Based on consultation and operational experience of other OWFs, recreational vessels may still choose to transit through the array area during the construction phase, noting that site access would not be prohibited except through active safety zones. Minimum spacing of 830 m between structures is considered as sufficient to facilitate this, and this aligns with consultation output including during the hazard workshop. As such, displacement of recreational vessels is anticipated to be limited and therefore no notable effect on collision risk is expected.

63 Any visual obstruction resultant of the Wind Turbine Generators (WTGs) during the operational phase is anticipated to be limited during the operational phase (see Section 9.11.1), and as such the same conclusion is drawn for the construction phase, given there will be fewer structures present for the majority of the construction phase, and noting the presence of the buoyed construction area.

Fishing vessels

64 Similar to recreational vessels, consultation and operational experience of other OWFs indicate fishing vessels may still choose to transit through the array area during the construction phase, noting that site access would not be prohibited except through active safety zones. Minimum spacing of 830 m between structures is considered as sufficient to facilitate such transits, and as such, displacement of fishing vessels is anticipated to be limited, and therefore no notable effect on collision risk is expected.

65 Any visual obstruction resultant of the WTGs during the operational phase is anticipated to be limited during the operational phase (see Section 9.11.1), and as such the same conclusion is drawn for the construction phase (given there will be fewer structures present for the majority of the construction phase).

Mitigation measures

66 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area; and
- Ongoing consultation with regards to layout design.

Significance

67 Frequency of occurrence is anticipated to be reasonably probable, given deviations will occur based on pre-wind farm routeing. However, given any deviations / displacement are anticipated to be very limited, severity of consequence in terms of a subsequent increase in collision risk is deemed to be negligible. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.10.2 Restriction of adverse weather routeing

68 The buoyed construction area and other construction activities could affect adverse weather routeing in the area. Adverse weather includes wind, wave, and tidal conditions as well as reduced visibility due to fog that can hinder a vessel's normal route and/ or speed of navigation. Adverse weather routes are assessed to be significant course adjustments to mitigate vessel movement in adverse weather conditions. When transiting in adverse weather conditions, a vessel is likely to encounter various kinds of weather and tidal phenomena, which may lead to severe roll motions, potentially causing damage to cargo, equipment and/or danger to persons on board. The sensitivity of a vessel to these phenomena will depend on the actual stability parameters, hull geometry, vessel type, vessel size and speed.

69 The presence of offshore structures within or near to any adverse weather routes may prevent the route from being used during adverse conditions. Mitigations for vessels include adjusting their heading to position themselves 45° to the wind, altering or delaying sailing times, reducing speed and/ or potentially cancelling journeys.

70 During the regular operator outreach, it was noted that certain vessels would have concern over passing offshore of the array (i.e., within the TSS lanes) during periods of adverse weather, and that passage inshore of the array would be preferred in such circumstances. The structures associated with AyM are not considered as affecting such passage, and there is considered to be sea room to navigate south of the array area should vessels choose to do so (noting that the other operational wind farms in the area would need to be accounted for). Advisory safe passing distances may be used around cable installation works, however any affected areas would be spatially limited and temporary.

71 There is considered to be suitable space within the TSS lanes during adverse conditions to facilitate any established adverse weather routes that already use the TSS for such purposes, and AyM is not anticipated to have any notable effect on such routeing, noting that no associated issues have been observed in relation to GyM.

Mitigation measures

72 Mitigation measures of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Buoyed construction / decommissioning area.

Significance

73 Frequency of occurrence is anticipated to be extremely unlikely given the limited anticipated effect of AyM on existing adverse weather routeing. Severity of consequence is deemed to be moderate given any necessary deviations on adverse weather routeing would be minor and temporary. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.10.3 Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel

74 Increases in wind farm vessel activity associated with the construction of AyM could lead to increased collision rates in the area with third-party traffic.

75 It is estimated that there could be up to 3,436 round trips from vessels associated with the construction of AyM. There are a number of ports that will be assessed for use during construction including (but not limited to) Mostyn, Rhyl, Conwy, Porth Penrhyn, Liverpool and Holyhead.

76 Project vessel movements will be managed via marine coordination to ensure disruption to third-party traffic is minimised, noting this will include project vessel procedures including the promulgation of indicative transit routes to site. Any other relevant information in relation to the construction of AyM would also be promulgated to ensure third-party traffic is aware of where there may be increased wind farm traffic.

77 It should also be considered that, as identified within the baseline assessment, there is operational traffic transiting to the operational wind farms in the area (including the adjacent GyM), and as such third-party vessels will be familiar with wind farm traffic, noting that similar transit routes to the array by project vessels are possible (the majority of existing traffic mobilises from Mostyn).

78 Where construction is ongoing at a structure, 500 m safety zones will be applied for to make it clear to passing vessels the area which should be avoided to ensure collision risk is minimised. Advisory safe passing distances may also be used around other sensitive operations that are not allowed a safety zone under the existing legislation (e.g. cable laying).

Mitigation measures

79 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;

- Application for safety zones;
- Marine coordination; and
- Guard vessels.

Significance

80 Frequency of occurrence is anticipated to be frequent given daily interactions are likely, however severity of consequence is deemed to be minor noting that while there may be an increase in encounters, this is not anticipated to lead to increased collision risk given the marine coordination and procedures in place. The effect is therefore concluded to be ***tolerable*** and ALARP which is not significant in EIA terms.

9.10.4 Vessel-to-structure powered allision risk

81 The pre-commissioned structures within the array area will create a vessel-to-structure allision risk to passing vessels under power.

Commercial vessels

82 Based on consultation and operational experience of other UK wind farms, it is likely that commercial vessels will deviate to avoid the buoyed construction area following commencement of construction. As such, it is likely that any associated allision would occur to pre-commissioned structures on the periphery of the array.

83 It is noted that concern was raised by Trinity House and CoS during consultation around the potential for the Met Mast to sit "outside" of the array area within the Other Infrastructure Zone. This would represent an isolated structure, noting that this would also place it in proximity to the deviated traffic associated with Point Lynas. On this basis the Other Infrastructure Zone has been refined post-PEIR to shift the potential Met Mast positions further from the Point Lynas traffic. The final position will be agreed with the MCA and Trinity House as part of the overarching layout approval process (it is anticipated that the agreement of the layout with the MCA and Trinity House will form a Marine Licence condition as outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4).

84 During the construction phase, operational mitigations (most notably operational lighting and marking) will not yet be active. However, construction phase mitigation measures will be in place, including promulgation of information, charting of structures, and temporary lighting and marking (including buoyage), details of which will be discussed and agreed with Trinity House (it is anticipated that the agreement of lighting and marking will form a Marine Licence condition as outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4). Where identified as necessary via risk assessment including consideration to the other mitigation measures in place, a guard vessel may also be used, which will alert passing vessels to the presence of the partial structures and ongoing construction.

85 Should a powered allision incident occur, it is anticipated that the impact energy would largely be absorbed by the structure rather than the vessel, noting the high level of construction standards for commercial vessels operating at sea, and the low likelihood of a vessel alliding at high speed. On this basis, the most likely outcome is minor damage sustained by the vessel, (i.e., hull damage). Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings, noting this aligns with incident statistics at constructing / operational wind farms to date.

Internal navigation

86 Unlike commercial vessels, experience of other operational projects shows that smaller vessels (e.g., fishing and recreational) may choose to transit through the array area including during the construction phase, and therefore there is an allision risk associated with the internal pre-commissioned structures.

87 Minimum spacing of 830 m is considered sufficient to allow safe navigation through the array for such vessels should they choose to transit through. As such there is an allision risk to pre-commissioned structures internal to the array.

88 All pre-commissioned structures will be marked with temporary lighting in line with Trinity House requirements to ensure they are visible to vessels (including those internal to the array). Details of structures would also be promulgated, and guard vessels may be used where identified as necessary via risk assessment.

89 In the event that an internal allision were to occur, it is likely that this would be low speed and therefore low impact energy, with the most likely outcome being minor damage to the vessel and/ or structure. Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings noting this aligns with incident statistics at constructing / operational wind farms to date.

Mitigation measures

90 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;
- Ongoing consultation with regards to layout design;
- Application for safety zones;
- Lighting and marking;
- Guard vessels;
- Framework layout commitments; and
- Blade clearance of at least 22 m above Mean High Water Springs (MHWS).

Significance

91 Frequency of occurrence is anticipated to be extremely unlikely noting the mitigation measures in place including use of a buoyed construction area. Severity of consequence is deemed to be serious. The effect is therefore concluded to be of ***tolerable*** significance and ALARP which is not significant in EIA terms, noting that the final layout including the Met Mast position will be agreed with the MCA and Trinity House (it is anticipated that the agreement of the layout with the MCA and Trinity House will form a Marine Licence condition as outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4).

9.10.5 Vessel-to-structure drifting allision risk

92 The pre-commissioned structures within the array will create a vessel to structure allision risk to drifting vessels Not Under Command (NUC).

Commercial vessels

93 As discussed in the assessment of powered allision risk (see Section 9.10.4), it is likely that commercial vessels will deviate to avoid the buoyed construction area following commencement of construction. As such, it is likely that any associated allision would occur to pre-commissioned structures on the periphery of the array.

94 In the event that a vessel starts to drift towards the array, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). The CoS noted during consultation the potential for a drifting vessel dropping anchor in an emergency to subsequently drag anchor and still allide with a structure, however such a scenario is considered an extremely low frequency event noting other mitigations may be available (e.g., use of thrusters as above). Further, any construction vessels on site may be able to provide assistance in liaison with MCA and as required under Safety of Life at Sea (SOLAS) obligations (IMO, 1974).

95 Should a drifting allision incident occur, it is anticipated that the impact energy would largely be absorbed by the structure rather than the vessel, noting the high level of construction standards for commercial vessels operating at sea. A drifting allision would also be expected to be of low speed and therefore low energy. On this basis, the most likely outcome is minor damage sustained by the vessel, (i.e., hull damage). Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings noting this aligns with incident statistics at constructing / operational wind farms to date.

Internal navigation

96 As discussed in the assessment of powered allision risk (see Section 9.10.4), smaller vessels (e.g., fishing and recreational) may choose to transit through the array area including during the construction phase, and therefore there is an allision risk associated with the internal pre-commissioned structures.

97 As is the case for passing traffic, in the event that a vessel within the array starts to drift towards a structure, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). Any construction vessels on site may be able to provide assistance in liaison with MCA and as required under SOLAS obligations (IMO, 1974).

98 In the event that an internal allision were to occur, it is likely that this would be low speed (i.e., drifting speeds) and therefore low impact energy, with the most likely outcome being minor damage sustained by the vessel, (i.e., hull damage). Allisions leading to more severe outcomes may still occur noting potential for higher drift speeds during periods of adverse weather than in typical conditions, however these are considered to be highly unlikely occurrences.

Mitigation measures

99 Mitigation measures deemed of relevance are as follows:

- Emergency Response Cooperation Plan (ERCoP);
- Appropriate marking on Admiralty charts;
- Promulgation of information;

- Buoyed construction / decommissioning area;
- Application for safety zones;
- Lighting and marking;
- Guard vessels; and
- Blade clearance of at least 22 m above MHWS.

Significance

100 Frequency of occurrence is anticipated to be extremely unlikely, with severity of consequence deemed to be serious. The effect is therefore concluded to be ***tolerable*** and ALARP which is not significant in EIA terms.

9.10.6 Reduced access to local ports

101 Vessels or activities associated with the construction of AyM may hinder third-party traffic access to local ports / facilities.

102 Based on the location of the array (including distance from local ports) and considering pre-wind farm vessel routeing, the buoyed construction area is expected to have limited effect on port access. Vessels accessing the inbound lane of Liverpool Bay TSS from Point Lynas may require limited deviations, however no impacts on pilot boarding at Point Lynas are anticipated, noting that the western extent of the site has been notably reduced since Scoping and further since the PEIR, thus increasing the distance between the structures and the Point Lynas area.

103 It is estimated that there could be up to 3,436 round trips from vessels associated with the construction of AyM. There are a number of ports that will be assessed for use during construction including (but not limited to) Mostyn, Rhyl, Conwy, Porth Penrhyn, Liverpool and Holyhead. It is noted that existing activity associated with existing operational wind farms (in particular GyM) is likely to mean local ports and third-party vessels are familiar with wind farm traffic.

104 Marine coordination will be in place to manage project vessel movements and minimise disruption to third-party vessels, and details of construction activities including vessels will be promulgated. As such, no notable impact on port access is expected from the construction vessels.

105 Advisory safe passing distances may be used around cable lay operations, which will include areas in the vicinity of the Outer Mostyn pilot boarding area and channels associated with access to Mostyn, however any such impacts will be spatially limited and temporary.

Mitigation measures

106 Mitigation measures deemed of relevance are as follows:

- Cable Burial Risk Assessment (CBRA);
- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Marine coordination.

Significance

107 Frequency of occurrence is anticipated to be extremely unlikely, noting the mitigations in place including marine coordination. Severity of consequence is deemed to be minor in terms of navigational safety. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.10.7 Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders

108 The construction of AyM may lead to an increase in baseline incident rates given the project vessels and crews / personnel in the area. This may impact upon emergency response resources capability to respond to all incidents that arise.

109 The baseline incident data shows that the majority of incidents in the area occur coastally. AyM is not anticipated to notably contribute to these baseline incident rates, noting that as per the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), there have not been a significant number of reported incidents associated with constructing or operational OWFs in the UK. It should also be considered that the on-site presence associated with the construction of AyM will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the projects (i.e. self-help resources), but also incidents occurring outside of the arrays to third-party vessels.

110 As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how it would cooperate and assist in the event of an incident. It is noted that the RNLI requested during consultation that communication procedures were put in place to ensure AyM can be reached if necessary. Appropriate procedures will therefore be discussed and agreed with the MCA as part of the ERCoP process, noting that all communication during an active SAR incident would be through Her Majesty's Coastguard (HMCG) as required by the MCA.

111 The final layout will be agreed with the MCA and Trinity House post-consent (it is anticipated that the agreement of the layout with the MCA and Trinity House will form a Marine Licence condition as outlined in Annex 5.4.1 Outline Approach to Marine Licencing (App Ref 5.4.1) to Consents and Licences Required Under Other Legislation (App Ref: 5.4)) and these discussions will include SAR considerations. This process will include account of the adjacent GyM array, and how the two projects interact in terms of SAR access. This will facilitate SAR access if needed during construction, noting that the final layout is of most relevance to the operational phase (see Section 9.11.7). In advance of consent, framework layout commitments have also been agreed with the MCA and Trinity House which will be used to inform the final layout approval process (post-consent) with MCA and Trinity House to ensure suitable SAR and surface navigation access, as well as acceptability for lighting and marking.

Mitigation measures

112 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- Marine pollution contingency plan;
- ERCoP;
- Ongoing consultation with regard to layout design
- Promulgation of information;
- Marine coordination; and
- Guard vessels.

Significance

113 Frequency of occurrence is anticipated to be negligible noting the limited anticipated increases in incident rates over the baseline and noting the on-site resources associated with AyM. However, severity of consequence is deemed to be serious. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.11 Environmental assessment: operational phase

9.11.1 Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures

114 The presence of the structures within the array area may lead to third-party vessel displacement / deviations, which could lead to increases in encounters and hence increased collision risk.

Commercial vessels

115 It is considered likely that commercial vessel deviations established during the construction phase will remain during the operational phase. As previously discussed in detail in Section 9.10, these anticipated deviations are considered to be minor, based both on the findings of the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) post-wind farm routeing assessment and outputs of the consultation process.

116 Should an encounter occur between two vessels, the most likely outcome is the implementation of collision avoidance action and the vessels complying with international and flag state regulations (including the Convention on International Regulations for Preventing Collisions at Sea (COLREGs) and SOLAS).

117 Based on the quantitative vessel-to-vessel collision assessment undertaken in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), a commercial vessel was estimated to be involved in a collision pre-wind farm once per 105 years. This rose to once per 103 years post-wind farm, which represents an increase of 2% as a result of AyM. The key area of change was around the north western extent of the array where the main route deviations are anticipated to occur.

118 Details of AyM would be promulgated to ensure passing vessels are able to effectively passage-plan in advance, noting that this will include display of the structures on appropriate nautical charts.

119 In the event that an encounter developed into a collision incident, based on historical collision consequences, the most likely outcome will be low impact contact between the vessels resulting in minor damage, and both vessels being able to continue on their respective passages. The worst-case outcome would be the foundering of one or both of the vessels, with pollution caused, but this is considered to be highly unlikely based on the NRA findings noting this aligns with incident statistics at constructing / operational wind farms to date.

Recreational vessels

120 Based on the available data sources and consultation, the highest density areas of recreational traffic in the area are coastal, however transits through the array were still recorded during the summer survey.

121 Based on consultation and operational experience of other OWFs, recreational vessels may choose to transit through the array during the operational phase, noting that site access would not be prohibited except through active major maintenance safety zones. Minimum spacing of 830 m between structures is considered as sufficient to facilitate this, and this aligns with consultation output including during the hazard workshop.

122 On this basis there is not anticipated to be notable levels of recreational displacement, and therefore limited change in collision risk.

123 Minimum spacing of 830 m is considered as sufficient to minimise probability of structures visually obstructing vessel line of sight to other vessels (both within and outwith the array). There is the potential that recreational vessels exiting the array into the TSS via the northern periphery may pose a collision risk to larger commercial vessels within the lanes. However, based on consultation outputs, recreational vessels are likely to generally avoid entry into the TSS from the array, and in line with COLREGS Rule 10 (IMO, 1972/77) would enter with caution if doing so (i.e. they would not rely on vessels outside of the array being aware of their presence, and would instead only enter if safe to do so).

Fishing vessels

124 Based on the available data sources and consultation, while the majority of fishing vessel traffic in the area uses the area outside of the array, activity may still occur including from non-AIS vessels. In this regard, it is noted that fishing vessel transits were recorded through the array within the survey data.

125 Fishing vessel behaviour relative to the array is considered likely to be similar to that of recreational vessels, in that they may choose to transit through the array, noting that minimum spacing of 830 m is considered as sufficient to facilitate such transits. On this basis there is not anticipated to be notable levels of fishing vessel displacement, and therefore no notable change in collision risk is expected.

126 Minimum spacing of 830 m is considered as sufficient to minimise probability of structures visually obstructing vessel line of sight to other vessels (both within and outwith the array). Regardless, in terms of potential collision risk associated with fishing vessels entering the TSS, COLREGS Rule 10 (IMO, 1972/77) would apply in that any entry into the lanes would be made with caution (i.e. they would not rely on vessels outside of the array being aware of their presence, and would instead only enter if safe to do so).

Mitigation measures

127 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Ongoing consultation with regards to layout design; and
- Promulgation of information.

Significance

128 Frequency of occurrence is anticipated to be reasonably probable. However, given any deviations / displacement are anticipated to be limited, severity of consequence is deemed to be negligible. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.11.2 Restriction of adverse weather routeing

129 The presence of the operational structures within the array could affect adverse weather routeing in the area. However, it is likely that by the stage that AyM is commissioned, any changes to adverse weather routeing will be well established, noting that as per Section 9.10.2, any changes are likely to be minor.

130 During the regular operator outreach, it was noted that certain vessels would have concern over passing offshore of the array (i.e. within the TSS lanes) during periods of adverse weather, and that passage inshore of the array would be preferred in such circumstances. As for the construction phase, the operational structures associated with AyM are not considered as affecting such passage, and there is considered to be sea room to navigate south of the array should vessels choose to do so (noting that the other operational wind farms in the area would need to be accounted for). Advisory safe passing distances may be used around cable maintenance works, however any affected areas would be spatially limited and temporary.

131 There is considered to be suitable space within the TSS lanes during adverse conditions to facilitate any established adverse weather routes that already use the TSS for such purposes, and AyM is not anticipated to have any notable effect on such routeing noting that no associated issues have been observed in relation to GyM.

Mitigation measures

132 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts; and
- Promulgation of information.

Significance

133 Frequency of occurrence is anticipated to be extremely unlikely given the limited anticipated effect of AyM on existing adverse weather routeing. Severity of consequence is deemed to be moderate. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.11.3 Increased vessel –to-vessel collision risk between a third-party vessel and a project vessel

134 Increases in wind farm vessel activity associated with the operation of AyM could lead to increased collision rates in the area (noting that any increases from the baseline are likely to be less than that during construction).

135 As for the construction phase, project vessel movements will be managed via marine coordination to ensure disruption to third-party traffic is minimised. Relevant information in relation to any major maintenance works would be promulgated to stakeholders, and this will include details highlighting where there may be increased wind farm traffic via indicative transit routes.

136 It should also be considered that, as identified within the baseline assessment, there is operational traffic transiting to the operational wind farms in the area (including the adjacent GyM), and that by the time of the operational phase, third-party vessels will be familiar with the additional traffic associated with AyM.

137 Where major maintenance is ongoing at a structure, 500 m safety zones will be applied for to make it clear to passing vessels the area which should be avoided to ensure collision risk is minimised. Advisory safe passing distances may also be used around other sensitive operations that are not allowed a safety zone under the existing legislation (e.g., cable maintenance).

Mitigation measures

138 Mitigation measures deemed of relevance are as follows:

- ERCoP;
- Promulgation of information;
- Application for safety zones;
- Marine coordination; and
- Guard vessels.

Significance

139 Frequency of occurrence is anticipated to be reasonably probable given interactions are likely, however severity of consequence is deemed to be minor given project vessels will be managed via marine coordination. The effect is therefore concluded to be ***broadly acceptable*** and ALARP which is not significant in EIA terms.

9.11.4 Vessel-to-structure powered allision

140 The operational structures within the array will create a vessel to structure allision risk to passing vessels under power.

Commercial vessels

141 It is likely that by the commencement of the operational phase, vessels will already be familiar with AyM, notably the locations of the structures (which will also be displayed on nautical charts). Operational mitigations will also be in place, in particular lighting and marking.

142 Based on the likely deviations, the area of highest allision risk is anticipated to be the north west corner of the array, noting that it was raised during consultation that vessels on transits between Point Lynas and Liverpool are likely to take the shortest safe route, meaning they will come into proximity with the nearby structures.

143 Concern was raised during consultation around the potential for the Met Mast to sit "outside" of the array within the Other Infrastructure Zone given this would represent an isolated structure, noting that this would also place it in proximity to the deviated traffic associated with Point Lynas. On this basis, the Other Infrastructure Zone has been refined post PEIR to shift the potential Met Mast positions further from the Point Lynas traffic. The final position will be agreed with the MCA and Trinity House as part of the overarching layout approval process.

144 Based on the allision modelling undertaken in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) (which includes a worst-case Met Mast position within the Other Infrastructure Zone), it was estimated that a commercial vessel under power would allide with a structure within the array once per 1,160 years assuming base case traffic levels.

145 It is noted that there have been no reported allisions to date between passing third-party traffic and the operational GyM structures (which are sited within 0.5 NM of the inbound Liverpool Bay TSS lane). As per the NRA, there has only been one reported third-party allision incident to date across all UK wind farms as a whole which includes projects in proximity to busy routeing measures.

146 Feedback provided as part of the Hazard Workshop was that standard lighting and marking was sufficient to minimise wind farm allision risk in the area including for AyM. The operational lighting and marking implemented will be agreed with Trinity House and align with IALA R139/G1162 (IALA, 2021) requirements.

147 Should a powered allision incident occur, it is anticipated that the impact energy would largely be absorbed by the structure rather than the vessel, noting the high level of construction standards for commercial vessels operating at sea, and the low likelihood of a vessel alliding at high speed. On this basis, the most likely outcome is minor damage sustained by the vessel, (i.e., hull damage). Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings noting this aligns with incident statistics at constructing and operational wind farms to date

Internal navigation

148 Unlike commercial vessels, experience of other operational projects shows that smaller vessels (e.g. fishing and recreational) may choose to transit through the array, and therefore there is an allision risk associated with the internal structures.

149 Minimum spacing of 830 m is considered sufficient to allow safe navigation through the array for such vessels should they choose to transit through, and it is noted that there will be a minimum blade clearance of 22 m above MHWS for the purposes of minimising potential recreational mast interaction with the blades.

150 The final layout will be discussed and agreed with MCA as required under the DCO, and as required by the MCA these discussions will include consideration of how the structures and their positioning may impact upon internal surface navigation, noting that there is potential for internal transits to occur based on the baseline assessment and consultation.

151 It is noted that there have been no reported allisions to date between recreational or fishing vessels and the operational GyM structures. As per the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), there has only been one reported third-party allision incident to date across all UK wind farms as a whole including projects in proximity to busy routeing measures.

152 In the event that an internal allision were to occur, it is likely that this would be low speed and therefore low impact energy, with the most likely outcome being minor damage to the vessel and/ or structure. Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings noting this aligns with incident statistics at constructing and operational wind farms to date.

Mitigation measures

153 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Ongoing consultation with regards to layout design;
- Framework layout commitments;
- Lighting and marking; and
- Blade clearance of at least 22 m above MHWS.
- the final layout including the Met Mast position will be agreed with MCA and Trinity House

Significance

154 Frequency of occurrence is anticipated to be extremely unlikely noting the mitigation measures in place including operational lighting and marking. Severity of consequence is deemed to be serious. The effect is therefore concluded to be of ***tolerable*** significance and ALARP which is not significant in EIA terms.

9.11.5 Vessel-to-structure drifting allision

155 The operational structures within the array may create a vessel-to-structure allision risk to drifting vessels (NUC).

Commercial vessels

156 Based on the allision modelling undertaken in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) (which includes a worst-case Met Mast position), it was estimated that a drifting commercial vessel would allide with a structure within the array approximately once per 2,800 years assuming base case traffic levels.

157 It is considered likely that the structures most at risk are those on the northern periphery based on the modelling output and consultation, noting that the majority of commercial traffic in the area uses the Liverpool Bay TSS lanes.

158 In the event that a vessel starts to drift towards the array, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). The CoS noted during consultation the potential for a drifting vessel dropping anchor in an emergency to subsequently drag anchor and still allide with a structure, however such a scenario is considered a low frequency event noting other mitigations may be available (e.g., use of thrusters as above). Further, any project vessels on site may be able to provide assistance in liaison with MCA and as required under SOLAS obligations (IMO, 1974).

159 Should a drifting allision incident occur, it is anticipated that the impact energy would largely be absorbed by the structure rather than the vessel, noting the high level of construction standards for commercial vessels operating at sea. Further, a drifting allision would be expected to be low speed and therefore low impact energy. On this basis, the most likely outcome is minor damage sustained by the vessel (i.e. hull damage). Higher consequence allisions are considered to be extremely low frequency events based on the NRA findings noting this aligns with incident statistics at constructing and operational wind farms to date.

Internal navigation

160 Unlike commercial vessels, experience of other operational projects shows that smaller vessels (e.g., fishing and recreational) may choose to transit through the array, and therefore there is an allision risk associated with the internal structures.

161 As is the case for passing traffic, in the event that a vessel within the array starts to drift towards a structure, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). It is also noted that any project vessels on site may be able to provide assistance in liaison with MCA and as required under SOLAS obligations (IMO, 1974).

162 In the event that an internal allision were to occur, it is likely that this would be low speed (i.e., drifting speeds) and therefore low impact energy, with the most likely outcome being minor damage to the vessel and / or structure. As for external navigation, allisions leading to more severe outcomes while possible are considered to be highly unlikely occurrences based on the NRA findings noting this aligns with incident statistics at constructing and operational wind farms to date.

Mitigation measures

163 Mitigation measures deemed of relevance are as follows:

- ERCoP;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Marine coordination;
- Lighting and marking;
- Guard vessels; and
- Blade clearance of at least 22 m above MHWS.

Significance

164 Frequency of occurrence is anticipated to be extremely unlikely, with severity of consequence deemed to be serious. The effect is therefore concluded to be ***tolerable*** and ALARP which is not significant in EIA terms.

9.11.6 Reduced access to local ports

165 Vessels or activities associated with the operation and maintenance of AyM may hinder third party traffic access to local ports / facilities.

166 Based on the location of the array (including distance from local ports) and considering pre-wind farm vessel routeing, the structures themselves are expected to have limited effect on port access. Vessels accessing the inbound lane of Liverpool Bay TSS from Point Lynas may require limited deviations, however no impacts on pilot boarding at Point Lynas are anticipated, noting that the western extent of the site has been removed since Scoping and additionally post-PEIR, increasing the distance between the structures and the Point Lynas area.

167 Project vessel levels associated with the operation and maintenance of AyM are not anticipated to notably increase overall traffic levels in the area. Regardless, marine coordination will be in place to manage project vessel movements and minimise disruption to third-party vessels. As such, no notable impact on port access is expected from project vessels.

168 Any periods of cable maintenance may lead to the use of advisory safe passing distances in the vicinity of the Outer Mostyn pilot boarding area or channels associated with access to Mostyn, however any such impacts will be spatially limited and temporary.

Mitigation measures

169 Mitigation measures deemed of relevance are as follows:

- CBRA;
- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Marine coordination.

Significance

170 Frequency of occurrence is anticipated to be extremely unlikely, noting the mitigations in place including marine coordination. Severity of consequence is deemed to be minor in terms of navigational safety. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.11.7 Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders

171 The operational presence of AyM may lead to an increase in baseline incident rates given the project vessels and crews / personnel in the area, and the associated maintenance during the operational phase. This may impact upon emergency response resources capability to respond to all incidents that arise, and the infrastructure may impact upon access to the array for SAR assets.

172 The baseline incident data shows that the majority of incidents in the area occur coastally. AyM is not anticipated to notably contribute to these baseline incident rates, noting that as per the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), there have not been a significant number of reported incidents associated with constructing or operational OWFs in the UK. It should also be considered that the on-site presence associated with the operation and maintenance of AyM will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the projects (i.e., self-help resources), but also incidents occurring outside of the arrays to third-party vessels.

173 As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how it would cooperate and assist in the event of an incident. It is noted that the RNLI requested during consultation that communication procedures were put in place to ensure AyM can be reached if necessary. Appropriate procedures will therefore be discussed and agreed with the MCA as part of the ERCoP process, noting that all communication during an active SAR incident would be through HMCG as required by the MCA.

174 The final layout will be agreed with the MCA and Trinity House post-consent, and these discussions will include SAR considerations in terms of ensuring appropriate access for SAR assets is facilitated by the structure locations. This process will include taking account of the adjacent GyM array, and how the structures associated with the two projects interact in terms of SAR access. In advance of consent, framework layout commitments have also been agreed with the MCA and Trinity House which will be used to inform the final layout approval process (post-consent) in agreement with MCA and Trinity House to ensure suitable SAR and surface navigation access (including consideration of GyM), as well as acceptability for lighting and marking. It is noted that the MDS (see Section 9.8) assumes as a worst-case and in line with the framework Layout Commitments that the layout will maintain a Single Line of Orientation.

Mitigation measures

175 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- Marine Pollution Contingency Plan;
- ERCoP;
- Ongoing consultation with regards to layout design;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Marine coordination;
- Framework layout commitments; and
- Guard vessels.

Significance

176 Frequency of occurrence is anticipated to be extremely unlikely noting the limited anticipated increases in incident rates over the baseline and noting the on-site resources associated with AyM. However, severity of consequence is deemed to be serious. The effect is therefore concluded to be of ***tolerable*** significance.

177 Assuming discussions are held with MCA to discuss and agree appropriate SAR access that accounts for GyM, the residual effect is considered to be ***tolerable with mitigation*** and ALARP.

9.11.8 Reduction in under-keel clearance resultant of cable protection

178 Any changes in under-keel clearance as a result of AyM could lead to a risk of under-keel interaction to passing vessels.

179 The use of external protection for the cables may be necessary if target burial depths cannot be met (noting that this will be determined via the CBRA. This is anticipated to be of maximum height 1.4 m. This could lead to reductions in under-keel clearance for passing vessels, and potential grounding / interaction risk, noting that charted water depths in the offshore ECC range from 18 m to 0.1 m.

180 One main route was identified as intersecting the offshore ECC (the wind farm vessel route associated with Rhyl Flats), however commercial vessels on additional "low use" routes were also recorded inshore of the array, and as such these transits may be affected by changes in water depths in the area. Smaller vessels including wind farm vessels could also be affected noting that they may be comfortable navigating closer inshore including in proximity to the landfall.

181 As required under MGN 654, the Applicant will consult with the MCA and Trinity House in any instances where water depths are reduced by more than 5% as a result of cable protection to determine whether additional mitigation is necessary to ensure the safety of passing vessels.

Mitigation measures

182 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- CBRA;
- Appropriate marking on Admiralty charts; and
- Promulgation of information.

Significance

183 Noting the mitigations proposed notably MGN 654 compliance, frequency of occurrence is anticipated to be extremely unlikely, with severity of consequence deemed to be moderate. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.11.9 Anchor interaction with subsea cables

184 The subsea cables associated with AyM and any external protection may cause an interaction risk to vessel anchors. Scenarios that could lead to cable interaction include:

- Vessel dragging anchor over subsea cable following anchor failure;
- Vessel anchoring in an emergency over cable (e.g., to avoid drifting into an offshore structure);
- Vessel dropping anchor inadvertently due to mechanical failure; or
- Inadvertent interaction via human error (e.g., use of out-of-date charts, neglecting to raise anchor when departing anchorage).

185 Anchoring in the area of AyM was observed to be primarily within the charted anchorages associated with Liverpool, and the area off Point Lynas, and anchoring in proximity to the offshore ECC was therefore limited. On this basis, anchor dragging risk is not considered likely to be significant, noting that vessels should take account of any charted cables when choosing where to drop anchor. This aligns with the outputs of the Hazard Workshop.

186 In a potential emergency incident, it is likely that a vessel would prioritise avoiding a collision or allision over potential anchor interaction, and this aligns with input received by the CoS during consultation. However, the majority of commercial traffic in the area uses routes associated with the TSS lanes, and as such will not interact with the offshore ECC. The potential for emergency anchoring will be considered within the CBRA, with burial depths and external protection used where necessary.

187 In the event that the anchor of a commercial vessel penetrated deep enough into the seabed to make contact with a cable, the most likely consequence is damage to the cable. However, the anchor of a smaller vessel (e.g., fishing, recreation) may snag the cable, which as a worst-case could lead to a loss of stability with risk of capsize. Consultation indicated that recreational vessels in the area are unlikely to drop anchor in deeper water depths, and as such any potential for interaction is likely to be restricted to the area near the landfall. This will be considered within the CBRA.

Mitigation measures

188 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- CBRA;
- Appropriate marking on Admiralty charts; and
- Promulgation of information.

Significance

189 Frequency of occurrence is anticipated to be extremely unlikely noting appropriate protection will be implemented via the CBRA, with severity of consequence deemed to be moderate. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.12 Environmental assessment: decommissioning phase

9.12.1 Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures

190 The presence of the buoyed decommissioning area may lead to third-party vessel displacement / deviations, which could lead to increases in encounters and hence collision risk.

191 In terms of commercial traffic on main routes, it is likely that commercial vessels will maintain the deviations already established during the operational phase. The presence of the buoyed decommissioning area may result in additional deviations dependent on the positions of the buoys, however any such deviations are likely to be minor and will be in line with those during the construction phase. Regardless, details of the decommissioning of AyM will be promulgated in advance, ensuring commercial vessels can passage plan to account for the structures and associated decommissioning work.

192 Site access would not be prohibited during decommissioning except through active safety zones, and as such levels of displacement of smaller vessels (e.g., fishing, recreation) will be similar to the construction phase (i.e., anticipated to be limited).

Mitigation measures

193 Mitigation meeasures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Ongoing consultation with regards to layout design; and
- Buoyed construction / decommissioning area.

Significance

194 Frequency of occurrence is anticipated to be reasonably probable. However, given any deviations / displacement are anticipated to be limited, severity of consequence is deemed to be negligible. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.12.2 Restriction of adverse weather routeing

195 It is not anticipated that effects on adverse weather routeing from the decommissioning of AyM would differ notably over those observed during the construction phase and operational phases, with any changes to baseline adverse weather routes likely to be well established by decommissioning (noting that as per Sections 9.10.2 and 9.11.2, any changes are anticipated to be minor).

Mitigation measures

196 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts; and
- Promulgation of information.

Significance

197 Frequency of occurrence is anticipated to be extremely unlikely given the limited anticipated effect of AyM on existing adverse weather routeing. Severity of consequence is deemed to be moderate given any necessary deviations on adverse weather routeing would be minor and temporary. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.12.3 Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel

198 Increases in wind farm vessel activity associated with the decommissioning of AyM could lead to increased collision rates in the area with third-party traffic.

199 It is likely that project vessel levels during the decommissioning phase will be similar to that during the construction phase (and hence increase over that of the operational phase). However, it is anticipated that by the point of decommissioning, third party traffic will be familiar with the wind farm vessels associated with AyM.

200 As for the other phases, project vessel movements during decommissioning will be managed via marine coordination to ensure disruption to third party traffic is minimised. Relevant information in relation to the decommissioning of AyM would be promulgated to stakeholders, and this will include details highlighting where there may be increased wind farm traffic.

201 It should also be considered that, as identified within the baseline assessment, there is operational traffic transiting to the operational wind farms in the area (including the adjacent GyM), and that by the point of decommissioning, changes in additional traffic associated with AyM will also be well established. Third-party vessels should therefore be familiar with wind farm traffic in the area (noting that there is likely to be an increase in wind farm traffic associated with AyM during decommissioning over operational phase levels).

202 Where sensitive decommissioning operations are ongoing at a structure, 500 m safety zones will be applied for to make clear to passing vessels the area which should be avoided to ensure collision risk is minimised. Advisory safe passing distances may also be used around other sensitive operations that are not allowed a safety zone under the existing legislation (e.g., cable laying).

Mitigation measures

203 Mitigation measures deemed of relevance are as follows:

- ERCoP;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;
- Application for safety zones;
- Marine coordination; and
- Guard vessels.

Significance

204 Frequency of occurrence is anticipated to be reasonably probable given interactions are likely, however severity of consequence is deemed to be minor given project vessels will be managed via marine coordination. The effect is therefore concluded to be ***broadly acceptable*** and ALARP which is not significant in EIA terms.

9.12.4 Vessel-to-structure powered allision risk

205 The powered allision risk to passing vessels during decommissioning is likely to be similar to that observed during construction, in that there may be partial structures without operational lighting and marking, noting that other mitigations will be in place (e.g., buoyed decommissioning area).

206 As for construction, passing commercial vessels are still likely to avoid the buoyed decommissioning area (hence peripheral structures would be most at risk), whereas smaller vessels (e.g., fishing and recreation) may still transit through.

207 There will be no allision risk once structures are removed.

Mitigation measures

208 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Ongoing consultation with regards to layout design;
- Buoyed construction / decommissioning area;
- Application for safety zones;
- Lighting and marking;
- Guard vessels;
- Framework layout commitments; and
- Blade clearance of at least 22 m above MHWS.

Significance

209 Frequency of occurrence is anticipated to be negligible, with severity of consequence deemed to be serious. The effect is therefore concluded to be ***broadly acceptable*** and ALARP which is not significant in EIA terms.

9.12.5 Vessel-to-structure drifting allision risk

210 The drifting allision risk to passing vessels during decommissioning is likely to be similar to that observed during construction, in that there may be partial structures within the array, and elevated levels of wind farm vessels on site that may be able to assist in the event of a drifting (NUC) vessel within or in proximity to the array.

211 As for construction, passing commercial vessels are still likely to avoid the buoyed decommissioning area (hence peripheral structures would be most at risk), whereas smaller vessels (e.g., fishing and recreation) may still transit through, hence at risk of allision with internal structures.

212 There will be no allision risk once structures are removed.

Mitigation measures

213 Mitigation measures deemed of relevance are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;
- Guard vessels; and
- Blade clearance of at least 22 m above MHWS.

Significance

214 Frequency of occurrence is anticipated to be negligible, with severity of consequence deemed to be serious. The effect is therefore concluded to be ***broadly acceptable*** and ALARP which is not significant in EIA terms.

9.12.6 Reduced access to local ports

215 The potential for port access restrictions during the decommissioning phase is considered likely to be similar (as a worst-case) to those observed during the construction phase, in that there may be an elevated level of wind farm traffic in the area. These movements would be managed via marine coordination to ensure any disruption was minimised.

216 As for the construction and operational phases, there is not considered likely to be any notable impacts on port access from the buoyed decommissioning area given its location relative to local ports, pilot areas and the pre-wind farm routeing.

217 It will be assessed in advance of decommissioning whether cables are left in situ. Should any decommissioning work associated with the cables be required, advisory safe passing distances around the work may be used. These would be spatially limited and temporary in nature, and as such are not anticipated to notably impact on port access.

Mitigation measures

218 Mitigation measures deemed of relevance are as follows:

- CBRA;
- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Marine coordination.

Significance

219 Frequency of occurrence is anticipated to be extremely unlikely, noting the mitigations in place including marine coordination. Severity of consequence is deemed to be minor in terms of navigational safety. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.12.7 Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders

220 The decommissioning of AyM may lead to an increase in baseline incident rates given the project vessels and crews / personnel in the area, and the associated maintenance during the operational phase. This may impact upon emergency response resources capability to respond to all incidents that arise, and the infrastructure may impact upon access to the array for SAR assets.

221 Given that there may be elevated wind farm vessel and personnel presence on site during the decommissioning phase in comparison to the operational phase, it is likely that any change in the baseline incident rates will be more similar to that of the construction phase.

222 The on-site presence associated with the decommissioning of AyM will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the projects (i.e., self-help resources), but also incidents occurring outside of the arrays to third-party vessels.

223 As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident. It is noted that the RNLI requested during consultation that communication procedures were put in place to ensure AyM can be reached if necessary. Appropriate procedures will therefore be discussed and agreed with the MCA as part of the ERCoP process, noting that all communication during an active SAR incident would be through HMCG as required by the MCA.

Mitigation measures

224 Mitigation measures deemed of relevance are as follows:

- MGN 654 compliance;
- Marine Pollution Contingency Plan;
- ERCoP;
- Ongoing consultation with regards to layout design;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Marine coordination;
- Framework layout commitments; and
- Guard vessels.

Significance

225 Frequency of occurrence is anticipated to be negligible noting the limited anticipated increases in incident rates over the baseline and noting the on-site resources associated with AyM. However, severity of consequence is deemed to be serious. The effect is therefore concluded to be ***broadly acceptable*** which is not significant in EIA terms.

9.13 Environmental assessment: cumulative effects

226 The overarching cumulative effects assessment methodology and long list are described in Volume 1, Annex 3.1: Cumulative Effects Assessment. Details of cumulative assessment applied for shipping and navigation users is provided in the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), and the screened in developments are given in Table 10. It is noted that given the unique nature of shipping and navigation as a topic, the cumulative tiering system applied is specific to the NRA and this chapter. Full details are provided in the NRA.

Table 10: Projects considered within the shipping and navigation cumulative effect assessment.

DEVELOPMENT TYPE	PROJECT	STATUS	DATA CONFIDENCE ASSESSMENT/ PHASE	TIER
Tidal Energy	NWTE Project	Early concept	Medium	3
Tidal Energy	Colwyn Bay Tidal Lagoon	Early concept	Medium	3
OWF	Cobra & Flotation Energy - Round 4	Concept/early planning	Low	3
Tidal Energy	Port of Mostyn Tidal Lagoon	Pre-planning	High	3
Gas Storage	Gateway Gas Storage	In planning	Low	3
Tidal Energy	Mersey Tidal Power	Pre-planning	Medium	3
OWF	EnBW and BP 2 - Round 4	Concept/early planning	Low	3
Tidal Energy Lease Area	Morlais Demonstrator	Consented	High	3
Tidal Energy Lease Area	Morlais Tidal Energy	Pre-planning application	High	3

DEVELOPMENT TYPE	PROJECT	STATUS	DATA CONFIDENCE ASSESSMENT/ PHASE	TIER
Tidal Energy Lease Area	Holyhead Deep (Minesto)	Scoping report submitted	High	3
Tidal Energy	Morecambe Bay Tidal Lagoon	In development	Medium	3
OWF	Isle of Man	Concept	Medium	3
Tidal Energy	Duddon Estuary Tidal Lagoon	Concept	Medium	3
Tidal Energy Lease Area	Bardsey Sound	Pre-Planning	High	3
Tidal Energy	Bardsey Sound (Enlli)	Pre-planning application	Medium	3
OWF	Codling Wind Park	Concept	Medium	3
OWF	Codling Wind Park Extension	Concept	Medium	3
OWF	North Irish Sea Array	Pre-planning application	Medium	3

DEVELOPMENT TYPE	PROJECT	STATUS	DATA CONFIDENCE ASSESSMENT/ PHASE	TIER
OWF	Braymore Point	Concept	Medium	3
Tidal Energy	West Cumbrian Tidal Lagoon	In planning	Medium	3
OWF	Cooley Point	Concept	Medium	3
OWF	Dublin Array	In-planning	Medium	3
OWF	Cloger Head	Concept	Medium	3
Tidal Energy - Demonstrator Array	Mull of Galloway	In development	Medium	3
Tidal Energy - Demonstrator Array	Strangford Lough Array	Pre-Planning	High	3
Tidal Energy	DeepGreen 1/10	In Planning	Medium	3
OWF	South Irish Sea Array	Concept	Medium	3
OWF	Arklow Bank Phase 2	Consented	Medium	3
OWF	Oriel	Concept	Medium	3

DEVELOPMENT TYPE	PROJECT	STATUS	DATA CONFIDENCE ASSESSMENT/ PHASE	TIER
OWF	Kilmichael Point	Concept	Medium	3
Tidal Energy	Solway Firth-Venturi Enhanced Turbine Technology (VETT)	In planning	Medium	3
Tidal Energy	Strumble Head Tidal Energy Project	Early planning	Medium	3

227 Table 11 presents the cumulative MDS, including screened in impacts, the cumulative scenario considered, and the rationale for including each within the cumulative assessment.

Table 11: Cumulative MDS.

POTENTIAL EFFECT	SCENARIO	JUSTIFICATION
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures	AyM with Tier 1-3 projects	While additional cumulative deviations to affected commercial routes are not expected as per NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), overall displacement in terms of potential interactions between all vessel types is still considered as requiring to be assessed on a cumulative basis.
Restriction of adverse weather routeing	AyM with Tier 1-3 projects	Potential impacts on adverse weather routeing should be assessed given potential for changes in available sea room.
Increased vessel -to-vessel collision risk between a third-party vessel and a project vessel	AyM with Tier 1-3 projects	Additional cumulative projects may raise wind farm vessel levels on a cumulative basis.
Vessel-to-structure powered allision risk	AyM with Tier 1-3 projects	Additional cumulative projects may raise allision risk in the area on a cumulative basis.
Vessel-to-structure drifting allision risk	AyM with Tier 1-3 projects	Additional cumulative projects may raise allision risk in the area on a cumulative basis.

POTENTIAL EFFECT	SCENARIO	JUSTIFICATION
Reduced access to local ports	AyM with Tier 1-3 projects	Additional cumulative projects, infrastructure, vessels or operations may increase cumulative effects on port access.
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders	AyM with Tier 1-3 projects	Additional cumulative projects may increase baseline incident rates on a cumulative basis.
Anchor interaction with subsea cables	AyM with Tier 1-3 projects	Additional cumulative projects may increase cable lengths in the area which may increase interaction risk on a cumulative basis.
Reduction in under-keel clearance resultant of cable protection	AyM with Tier 1-3 projects	Additional cumulative projects may increase areas where navigable depths are affected on a cumulative basis.

Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures

228 As per the findings of the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)), the main routes anticipated to require deviation as a result of AyM do not interact with any developments screened into the cumulative assessment. As such, magnitude of cumulative deviations are anticipated to align with the in-isolation assessment (see Sections 9.10.1, 9.11.1, and 9.12.1). This is reflective of the location of the array being south of the Liverpool Bay TSS, and hence not interacting with the majority of routeing in the area.

229 Taking this into account and noting the size of the cumulative area considered, frequency of occurrence is anticipated to be reasonably probable, with severity of consequence deemed to be negligible. The cumulative effect therefore is concluded to be **broadly acceptable** which is not significant in EIA terms.

Restriction of adverse weather routeing

230 As per the in-isolation assessment (see Sections 9.10.2, 9.11.2, and 9.12.2), AyM is not anticipated to have notable impact on adverse weather routeing in the area.

231 The area of most concern was inshore of the array, given certain vessels would prefer to avoid the outbound TSS lane during adverse conditions. However, the cumulative projects considered do not impact on routeing inshore of the array (or within the TSS if this is vessel preference), and as such there is not anticipated to be additional cumulative deviations.

232 The frequency of occurrence is anticipated to be extremely unlikely, and severity of consequence deemed to be moderate. The cumulative effect is therefore concluded to be **broadly acceptable** which is not significant in EIA terms.

Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel

233 Increases in wind farm vessel activity associated with AyM and other cumulative projects could lead to increased collision rates in the area (wind farm vessel to third party).

234 The majority of existing wind farm traffic in the area originates from Mostyn, however there is low confidence as to where traffic associated with both AyM and other cumulative projects (i.e., non-baseline) will mobilise from. Regardless, baseline wind farm traffic levels are such that third-party vessels will likely be familiar with the associated transits. Further, all developers should be establishing appropriate vessel management procedures (e.g., marine coordination) which will facilitate any cumulative impact being minimised.

235 On this basis, cumulative collision risk associated with wind farm traffic is assessed as being of major consequence but extremely unlikely occurrence, and therefore **broadly acceptable,** which is not significant in EIA terms.

Vessel-to-structure powered allision risk

236 As required, the AyM layout will be discussed and agreed with the MCA-post-consent. These discussions will include consideration of the existing operational wind farms in the area in terms of surface navigation, in particular GyM.

237 Similarly, lighting and marking may require cumulative consideration, and therefore any associated requirements will be discussed and agreed with key stakeholders, including Trinity House and the MCA. Lighting and marking were raised as the key mitigation to minimise allision risk during the hazard workshop process.

238 Other cumulative projects (i.e., non-baseline) are considered as being sufficiently spaced from the array not to create notable cumulative allision risk (the nearest screened-in cumulative OWF is located in excess of 15 NM from the array).

239 Therefore, taking into account the size of the cumulative area considered, cumulative allision risk is assessed as being of serious consequence but negligible occurrence, and therefore **broadly acceptable,** which is not significant in EIA terms.

Vessel-to-structure drifting allision risk

240 The screened-in cumulative projects (i.e., non-baseline) are considered as being sufficiently spaced from the array not to create notable cumulative drifting allision risk (noting the nearest screened-in cumulative OWF is located in excess of 15 NM from the array). On this basis, any allision risk to an NUC vessel will be localised.

241 Further, as is the case for AyM, the available on-site resources associated with other cumulative projects may be able to assist in the event of a drifting vessel being in proximity to wind farm structures.

242 Taking into account the size of the cumulative area considered, cumulative allision risk is assessed as being of serious consequence but negligible occurrence, and therefore **broadly acceptable,** which is not significant in EIA terms.

Reduced access to local ports

243 Vessels or activities associated with AyM may hinder third-party traffic access to local ports / facilities when considered on a cumulative basis with other screened-in cumulative projects.

244 As per the in-isolation assessment (see Sections 100, 9.11.6, and 9.12.6), the AyM structures and infrastructure are not considered likely as having any impact on port access (including pilotage). Assessing likely post-wind routeing against the locations of other cumulative projects indicates this will remain the case on a cumulative basis.

245 Depending on the locations of cumulative project construction / operation bases, there may be a cumulative increase in wind farm traffic associated with certain ports. However, it is anticipated that projects will have marine coordination in place to manage wind farm vessel movements and minimise disruption to third-party vessels, and engage in promulgation of information. As such, no notable impact on port access is expected from the wind farm vessels.

246 The frequency of occurrence is anticipated to be extremely unlikely, noting the mitigations in place including marine coordination. The severity of consequence is deemed to be minor in terms of navigational safety. The cumulative effect is therefore concluded to be **broadly acceptable** which is not significant in EIA terms.

Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders

247 An increase in incident rates may arise as a result of AyM when considered in combination with other cumulative screened in projects, leading to an effect on emergency response resources.

248 However, given low baseline incident rates, and noting the additional "self-help" resources that would be available at both AyM and other cumulative projects, there is not considered likely to be an adverse effect on emergency response resources on a cumulative level.

249 As required, the final AyM layout will be agreed with the MCA post-consent, and these discussions will include SAR considerations at a cumulative level (notably in relation to the adjacent GyM).

250 Taking into account the size of the cumulative area considered, the cumulative risk is assessed as being of serious consequence but negligible occurrence, and therefore **broadly acceptable,** which is not significant in EIA terms.

Anchor interaction with subsea cables

251 The subsea cables associated with AyM when considered in combination with the subsea cables associated with other cumulative projects may cause a cumulative interaction risk to third-party vessel anchors.

252 Existing cables do lie within, or in proximity to, the offshore ECC (notably including GyM), and these will be considered within the CBRA undertaken for AyM in terms of necessary burial depths and the requirement for any additional external protection.

253 There is low confidence in terms of cable locations for other cumulative projects, however the developers of any future cables in proximity would be undertaking their own similar assessments, noting that cable interaction risk is considered as being localised to the area in the immediate vicinity of the cables.

254 Taking into account the size of the cumulative area considered, frequency of occurrence is anticipated to be extremely unlikely, with severity of consequence deemed to be moderate. The cumulative risk is therefore assessed to be **broadly acceptable**, which is not significant in EIA terms.

Reduction in under-keel clearance resultant of cable protection

255 Any changes in water depths resultant of AyM in combination with changes arising from other screened-in cumulative projects could lead to cumulative risk to passing vessels of under-keel interaction.

256 As per the in-isolation assessment (see Section 9.11.8), it is likely that any under-keel impacts will be associated with the offshore ECC and as such will occur inshore of the array. As required under MGN 654, the Applicant will consult with the MCA in the event that charted water depths are reduced by more than 5% as a result of AyM. Any future OWF projects will be required to have similar discussions with the MCA. Regardless, the locations of other screened-in projects indicate that a cumulative interaction is unlikely in terms of under-keel risk.

257 Noting the mitigations in place notably MGN 654 compliance, frequency of occurrence is anticipated to be extremely unlikely, with severity of consequence deemed to be moderate. The effect is therefore concluded to be **broadly acceptable** which is not significant in EIA terms.

9.14 Inter-relationships

258 Consideration of potential inter-related impacts associated with other topics is provided in Volume 2, Chapter 14: Interrelationships (application ref: 6.2.14).

9.15 Transboundary effects

259 Transboundary impacts of OWFs with regard to vessel routeing including to international ports are considered to have been assessed within the cumulative assessment in Section 9.13. Individual transits may have the potential to be associated with vessels that are internationally owned or located, however such individual transits have been captured and considered as part of the baseline assessment of marine traffic (as assessed within the NRA (Volume 4, Annex 9.1 (application ref: 6.4.9.1)) and summarised in Section 9.7.3).

260 As such no transboundary impacts other than those already assessed are anticipated.

9.16 Summary of effects

261 A summary of the findings of the impact assessment (both in isolation and cumulative) in terms of impact significance is given in Table 12.

Table 12: Summary of effects.

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
CONSTRUCTION				
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures	Reasonably probable	Negligible	n/a	Broadly acceptable (not significant in EIA terms)
Restriction of adverse weather routeing	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel	Frequent	Minor	n/a	Tolerable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
Vessel-to-structure powered allision risk	Extremely unlikely	Serious	n/a	Tolerable (not significant in EIA terms)
Vessel-to-structure drifting allision risk	Extremely unlikely	Serious	n/a	Tolerable (not significant in EIA terms)
Reduced access to local ports	Extremely unlikely	Minor	n/a	Broadly acceptable (not significant in EIA terms)
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
OPERATION				
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and	Reasonably probable	Negligible	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
proximity to routeing measures				
Restriction of adverse weather routeing	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel	Reasonably probable	Minor	n/a	Broadly acceptable (not significant in EIA terms)
Vessel-to-structure powered allision risk	Extremely unlikely	Serious	n/a	Tolerable (not significant in EIA terms)
Vessel-to-structure drifting allision risk	Extremely unlikely	Serious	n/a	Tolerable (not significant in EIA terms)
Reduced access to local ports	Extremely unlikely	Minor	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders	Extremely unlikely	Serious	Agreement of layout with MCA post-consent informed by pre-consent discussions.	Tolerable with mitigation (not significant in EIA terms assuming implementation of additional mitigations)
Reduction in under-keel clearance resultant of cable protection	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
Anchor interaction with subsea cables	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
DECOMMISSIONING				
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and	Reasonably probable	Negligible	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
proximity to routeing measures				
Restriction of adverse weather routeing	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel	Reasonably probable	Minor	n/a	Broadly acceptable (not significant in EIA terms)
Vessel-to-structure powered allision risk	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
Vessel-to-structure drifting allision risk	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
Reduced access to local ports	Extremely unlikely	Minor	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
Reduction of SAR capability due to increased incident rates and reduced access for surface / air responders	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
CUMULATIVE EFFECTS				
Increased vessel-to-vessel collision risk between third-party vessels resulting from displacement and proximity to routeing measures	Reasonably probable	Negligible	n/a	Broadly acceptable (not significant in EIA terms)
Restriction of adverse weather routeing	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
Increased vessel-to-vessel collision risk between a third-party vessel and a project vessel	Extremely unlikely	Major	n/a	Broadly acceptable (not significant in EIA terms)
Vessel-to-structure powered allision risk	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
Vessel-to-structure drifting allision risk	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)
Reduced access to local ports	Extremely unlikely	Minor	n/a	Broadly acceptable (not significant in EIA terms)
Reduction of SAR capability due to increased incident rates and reduced	Negligible	Serious	n/a	Broadly acceptable (not significant in EIA terms)

IMPACT	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	MITIGATION MEASURES	RESIDUAL EFFECT
access for surface / air responders				
Reduction in under-keel clearance resultant of cable protection	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)
Anchor interaction with subsea cables	Extremely unlikely	Moderate	n/a	Broadly acceptable (not significant in EIA terms)

9.17 References

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