Awel y Môr Offshore Wind Farm

Preliminary Environmental Information Report

Volume 2, Chapter 12: Other Marine Users and Activities

Date: August 2021

Revision: A

REVISION	DATE	STATUS/ REASON FOR ISSUE	AUTHOR:	CHECKED BY:	APPROVED BY:
A	August 2021	PEIR	GoBe Consultant	RWE	RWE

Contents

Figures

Tables

Glossary of terms

TERM	DEFINITION
Carbon Capture Usage and Storage (CCUS)	CCUS is the process of capturing waste carbon dioxide (CO_2), transporting it to a storage site and depositing it where it will not enter the atmosphere.
Douglas Complex	The three-platform facility at the Douglas oil and gas field.
Marine aggregate extraction	Marine aggregate extraction is the process of removing naturally occurring sand and gravels found on the inner continental shelf off the UK coast for use in construction, land reclamation or beach replenishment.
Offshore substation(s)	One or more offshore substations to convert the power to higher voltages and/or to High Voltage Direct Current (HVDC) and transmit this power to shore.

Abbreviations and acronyms

TERM	DEFINITION
AEZ	Archaeological Exclusion Zone
AfL	Area for Lease
ALARP	As Low As Reasonably Possible
AyM	Awel y Môr Offshore Wind Farm
BEIS	Department for Business, Energy and Industrial Strategy
BMAPA	British Marine Aggregate Production Areas
BSL	Below sea level

TERM	DEFINITION
CCUS	Carbon Capture, Usage and Storage
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries & Aquaculture Science
CO_2	Carbon dioxide
CTV	Crew Transfer Vessel
DECC	Department for Energy and Climate Change (now BEIS)
DEXA	Danger Areas Exercise Area
DML	Deemed Marine Licence
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
EnBW	Energie Baden-Württemberg AG
ES	Environmental Statement
FEED	Front End Engineering and Design
GyM	Gwynt y Môr Offshore Wind Farm
HRA	Habitats Regulations Assessment
IALA	Lighthouse Authorities
JUV	Jack-up Vessel
KISORCA	Kingfisher Information Service – Cable Awareness
MDS	Maximum Design Scenario
MHCLG	Ministry of Housing, Communities and Local Government's
MHWS	Mean High Water Springs
MoD	Ministry of Defence

TERM	DEFINITION
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NtM	Notice to Mariners
O&G	Oil and Gas
OFTO	Offshore Transmission Owner
OGA	Oil and Gas Authority
OMU	Other Marine Users
OREIs	Offshore Renewable Energy Installations
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PEXAs	Practice and Exercise Areas
PLG	Public Liaison Groups
PVM	Permanent Vessel Moorings
SPMP	Scour Protection Management Plan
TAN	Technical Advice Notes
TCE	The Crown Estate
TH	Trinity House
UKSAP	UKs Storage Appraisal Project
UNCLOS	United Nations Convention on the Law of the Sea
UXO	Unexploded Ordnance
WNMP	Welsh National Marine Plan

TERM	DEFINITION
ZoI	Zone of Influence

Units

UNIT	DEFINITION
BCM	Billion Cubic Meters
km	Kilometre
MT	Metric Tonne
MW	Megawatt

12 Other marine users and activities

12.1 Introduction

1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the results of the assessment of the likely significant effects of Awel y Môr Offshore Wind Farm (hereafter referred to as AyM) with respect to Other Marine Users and activities (OMU) during construction, operation and maintenance (O&M) and decommissioning phases that are not covered by other topic-specific chapters. It should therefore be read in conjunction with the description of the proposed development, which is provided in Volume 2, Chapter 1: Offshore Project Description and the relevant parts of the following chapters:

- Volume 2, Chapter 6: Fish and Shellfish Ecology;
- Volume 2, Chapter 8: Commercial Fisheries;
- Volume 2, Chapter 9: Shipping and Navigation;
- Volume 2, Chapter 11: Offshore Archaeology;
- Volume 2, Chapter 13: Aviation and Radar;
- Volume 3, Chapter 3: Socioeconomics; and
- Volume 3, Chapter 4: Tourism and recreation.

2 This chapter describes:

- The legislation, planning policy and other documentation that has informed the assessment (Section 12.2: Statutory and policy context);
- The outcome of consultation engagement that has been undertaken to date, including how matters relating to OMU within the Scoping Opinion received in July 2020 have been addressed (Section 12.1: Consultation and scoping);
- The scope of the assessment for OMU and the methods used for gathering baseline data (Section 12.4: Scope of the assessment and methodology);
- The criteria used for this assessment (Section 12.5: Assessment criteria);
- The uncertainties and technical difficulties (Section 12.6: Uncertainty and technical difficulties encountered);

- The overall existing baseline environment (Section 12.7: Existing environment);
- The different key parameters for the PEIR assessment (Section 12.8: Key parameters for assessment, Table 10);
- Embedded environmental measures relevant to OMU and the relevant maximum design scenario (MDS) (Section 12.9: Basis for PEIR assessment, Table 11);
- The assessment of OMU effects (Section 12.10 - 12.12: Environmental assessments: Construction, Operation and Decommissioning);
- Consideration of cumulative effects (Section 12.13: Cumulative effects);
- Consideration of Inter-related effects (Section 12.14: Inter-related effects);
- Consideration of transboundary effects (Section 12.15: Transboundary effects); and
- A summary of residual effects for OMU (Section 12.16: Summary of effects).

12.2 Statutory and policy context

3 This section identifies the legislation and policy that has informed the assessment of effects with respect to OMU. Further information on legislation, policies and guidance relevant to the EIA is provided in Volume 1, Chapter 2: Policy and legislation.

4 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (collectively referred to as 'the EIA Regulations'), and the Environment Act (1995) are considered along with the legislation of specific relevance to OMU as identified within Table 1 Welsh national planning is also included, including the Welsh National Marine Plan (WNMP), which was published on 12 November 2019 and contains policy across a range of considerations (including nature conservation, sustainable use, seascape, and coastal communities and economic growth). The WNMP includes sector objectives for renewable energy to support decarbonisation of the Welsh economy and the use of marine renewable energy generation (including Offshore Wind Farms (OWF)).

5 Table 1 includes a summary of the key provisions of the WNMP that are of relevance to this assessment.

Table 1: Legislation and policy context.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
Legislation		
United Nations Convention on the Law of the Sea (UNCLOS)	Article 79: Submarine cables and pipelines on the continental shelf. This article protects submarine cables and pipelines and requires AyM to have due regard for any existing cables or pipelines in position and not prejudice the possibilities of repair.	Submarine cables and pipelines are considered within the existing environment (Section 12.7) and are considered within the Environmental assessment (Section 12.10 - 12.12) throughout the projects lifetime.
	Article 113: high sea areas. This article states that if a submarine or power cable is broken or injured, this will be a punishable offence. If a cable or pipeline is broken during the laying or repairing of another cable, AyM will be subject to pay the repair costs.	
The Submarine Telegraph Act (1885)	This act protects submarine cables.	
Policy		

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
National Policy Statement (NPS) for Renewable Energy (EN-3) (DECC, 2011b)	EN-3, paragraph 2.6.35: There may be constraints imposed on the siting or design of offshore wind farms because of restrictions resulting from the presence of other offshore infrastructure or activities.	Site selection is addressed in Volume 1, Chapter 4: Site Selection and consideration of alternatives.
	EN-3, paragraph 2.6.179: Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure or has the potential to affect activities for which a licence has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs.	Consideration of other plans, projects and activities throughout the lifetime of this project is made throughout this chapter. Existing offshore infrastructure is considered within the assessment (Sections 12.10 - 12.12).
	EN-3, paragraph 2.6.180: Applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as	AyM have undertaken a thorough pre-application consultation process which has been used to inform the EIA. Section

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	many issues as possible prior to the submission of an application to the IPC.	12.1 provides details of the relevant OMU consultation.
	EN-3, paragraph 2.6.184: As such, the IPC should be satisfied that the site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. The IPC should not consent applications which pose unacceptable risks to safety after mitigation measures have been considered.	Site selection is addressed in Volume 1, Chapter 4 and Volume 3, Chapter 3. The project has been located in order to minimise, as far as practicable, disruption to existing infrastructure and other users through The Crown Estate (TCE) leasing process. Where it has not been possible to fully avoid interaction this assessment (Sections 12.10 - 12.12) identifies where potentially significant effects have been identified and where mitigation is proposed and/or consultation with third-parties has been undertaken in order to reduce potential effects to acceptable levels.
	EN-3, paragraph 2.6.187: Detailed discussions between the applicant for the offshore wind farm and the relevant consultees should have progressed as far as	Section 12.9 identifies those measures embedded into the project design that seek to mitigate potential effects on

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	reasonably possible prior to the submission of an application to the IPC. As such, appropriate mitigation should be included in any application to the IPC, and ideally agreed between relevant parties.	relevant parties. Where there is potential for significant effects on OMUs that are not mitigated at this (PEIR) stage, AyM will continue to consult with the relevant parties to (as noted above) seek agreement on appropriate controls.
Welsh Planning		
Welsh National Marine Plan	Policy DEF_01 states: DEF_01: Defence (safeguarding) Proposals that: •potentially affect Ministry of Defence (MoD) Danger Areas, Exercise Areas or strategic defence interests; and/or • potentially interfere with communication, surveillance and navigation facilities necessary for defence and national security; should only be authorised with the agreement of MoD	MoD activities (Practice and Exercise Area (PEXAs) or Danger Areas Exercise Areas (DEXAs)) are identified in the baseline section of this chapter (Section 12.7), however no existing or planned MoD areas overlap with the draft order limits and are therefore scoped out from further assessment within the chapter as agreed with PINS Scoping (Table 2) and detailed in Section 12.3.2. Strategic interests, such as radar are considered in detail within Volume 2, Chapter 13

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	Policy SAF_01 states: SAF_01: Safeguarding existing activity a. Proposals likely to have significant adverse impacts upon an established activity covered by a formal application or authorisation must demonstrate how they will address compatibility issues with that activity. Proposals unable to demonstrate adequate compatibility must present a clear and convincing case for the proposal to progress under exceptional circumstances. b. Proposals likely to have significant adverse impacts upon an established activity not subject to a formal authorisation must demonstrate how they will address compatibility issues with that activity. Proposals unable to demonstrate adequate compatibility must present a clear and convincing case for proceeding. Under SAF_01 a and b, compatibility should be demonstrated through, in order of preference: • Avoiding significant adverse impacts on those activities, and/or	SAF_01 applies to all sectors other than defence. Consented activities, and activities requiring consent for which a formal application has been submitted, can be identified spatially on maps as discrete areas (such as aggregates), existing activities not requiring formal consent are typically diverse and spatially widespread (e.g. fishing or tourism and recreation). This chapter covers all licensed activities such as aggregates, disposals, subsea cables etc. as well as recreational fishing. Tourism and recreation, including recreational watersports, is covered in Volume 3, Chapter 4. An assessment of the potential impacts on the existing activity of offshore recreational fishing is presented in Section 12.10 to 12.12 of this chapter.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	• Minimising significant adverse impacts where these cannot be avoided; and/or • Mitigating significant adverse impacts where they cannot be minimised	The embedded mitigation measures seek to reduce and/ or avoid adverse impacts are presented in Table 11. No significant adverse impacts, with the embedded mitigation measures in place, were identified.

12.3 Consultation and scoping

6 AyM submitted a Scoping Report and request for a Scoping Opinion to the Secretary of State (SoS) (administered by the Planning Inspectorate (PINS) in March 2020. A Scoping Opinion was received in July 2020. The Scoping Report set out the proposed OMU assessment methodologies, an outline of the baseline data collected to date and the scope of the assessment. Table 2 sets out the comments received in Section 4.12 of the PINS Scoping Opinion Aspect Based Scoping Tables – Other Marine Users and activities and how these have been addressed in this PEIR. Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report. Consultation was undertaken at the scoping stage, which did not identify any matters of specific relevance to OMU beyond recreational fishing which has since been the primary focus of ongoing consultation (see Table 2).

7 There are a number of topics which have had early engagement with stakeholders that are relevant to OMU receptors. This is described in detail within: Volume 2, Chapter 6, Volume 2, Chapter 8, Volume 2, Chapter 9, Volume 3, Chapter 4 and Volume 3, Chapter 3.

Table 2: Summary of consultation relating to Other Marine Users.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
July 2020 PINS Scoping Opinion	Potential impacts to carbon capture and storage infrastructure Paragraph 885 states that this matter is proposed to be scoped out of further assessment, however, Table 73 states that direct effects on carbon capture proposed injection wells and connections at the Hamilton gas field, for which route is currently unknown, will be assessed. For clarity, the Inspectorate agrees that these matters should be included in the assessment presented in the ES where significant effects are likely to occur.	Potential impacts to Carbon Capture, Usage and Storage (CCUS) have been scoped out as no existing or planned sites overlap with the study area and therefore no significant effects are likely to occur (as per Table 4). Cables and pipelines are assessed separately in Section 12.10 to 12.12.
	Direct effects on other OWF from turbine and array infrastructure construction The Scoping Report demonstrates no spatial overlap between the array area and other OWF. However, the proposed development is immediately adjacent to Gwynt y Môr OWF. The Inspectorate notes paragraph 889 and the general assertions around the mitigation and avoidance measures to be implemented, however without information	The assessment of impacts from construction activities on other OWFs is assessed in Section 12.10 to 12.12 (as per Table 3). Shipping and Navigation receptors are assessed in Volume 2, Chapter 9.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	on specific measures at this stage it is not considered possible to exclude potential impacts during construction. The Inspectorate advises that the ES should assess construction impacts on other OWF where significant effects are likely and provide detailed information where relevant as to how impacts can be avoided or reduced. The Inspectorate notes that effects from export cable construction remain scoped in and agrees with this approach. The Inspectorate also notes that effects on navigational matters will be assessed separately.	
	Direct impacts on oil and gas infrastructure from construction and operation activities such as increased vessel traffic or from physical disruption within the construction footprint The Scoping Report demonstrates no spatial overlap between the array area and existing oil and gas infrastructure. It also states that increases in vessel traffic during construction and operation will be assessed in the ES chapter on shipping and navigation. The Inspectorate	This has been noted by the Applicant and on this basis, effects on Oil and Gas (O&G) infrastructure have been scoped out from this assessment (as per Table 4).

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	agrees that this matter can be scoped out of the assessment.	
	Direct impacts (physical disruption or damage) on non OWF cables from construction activities in the array area Given the information in the Scoping Report demonstrating the lack of spatial overlap with the array area, the Inspectorate agrees that significant effects are unlikely and that further assessment of direct construction effects on non OWF cables can be scoped out.	This has been noted by the Applicant and on this basis effects on non OWF cables within the array have been scoped out from this assessment (as per Table 4), however there is overlap with other non-OWF cables in the ECC, and therefore this is assessed in Section 12.10 to 12.12.
	Direct effects on nuclear cooling and intake systems from construction and operation The Scoping Report provides information to establish that there is no spatial overlap between existing infrastructure or planned sites and the proposed development. The Inspectorate agrees that, provided this remains the case, significant effects are unlikely and agrees to scope out further assessment in the ES.	This has been noted by the Applicant and on this basis effects on nuclear cooling and intake systems have been scoped out from this assessment (as per Table 4).

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	Direct effects on aggregate sites from construction and operation The Scoping Report provides information to establish that there is no spatial overlap between existing production or application areas and the proposed development. The Inspectorate agrees that, provided this remains the case, significant effects are unlikely and agrees to scope out further assessment in the ES.	This has been noted by the Applicant and on this basis effects on aggregate sites have been scoped out from this assessment (as per Table 4).
	Direct impacts on offshore disposal areas from construction and operation The Scoping Report provides information to establish that there is no spatial overlap between existing active sites and the proposed development. The Inspectorate agrees that, provided this remains the case, significant effects are unlikely and agrees to scope out further assessment in the ES.	This has been noted by the Applicant and on this basis effects on offshore disposal areas have been scoped out from this assessment (as per Table 4).
	Direct effects on military infrastructure or areas during construction or operation	This has been noted by the Applicant and on this basis effects on military infrastructure and areas

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	The Scoping Report provides information to establish that there is no spatial overlap between existing active sites and the proposed development. The Inspectorate agrees that, provided this remains the case, significant effects are unlikely and agrees to scope out further assessment in the ES.	have been scoped out from this assessment (as per Table 4). Any conflicts with MoD aviation and radar activities are addressed in Volume 2, Chapter 13.
	Direct impacts on other OWF during operation Noting that the Rhyl Flats OWF is surrounded by the ECR search area, the potential exists for maintenance activities to therefore be carried out within its vicinity. In the absence of further refinement of the ECR at this stage, the Inspectorate advises that the ES should include an assessment of operational impacts on this OWF and associated infrastructure where significant effects could occur.	Potential impacts on other OWFs (including Rhyl Flats OWF) during the operation phase is assessed in Section 12.11 (as per Table 3.
	Direct impacts on cables during operation Table 74 proposes to scope operational effects out based on lack of spatial overlap, however, Table 73 includes assessment of operational effects on cables (the type is not	Potential impacts on OWF cables during the operation phase is assessed in Section 12.11 (as per Table 3.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	specified) due to maintenance activities. For clarity, the Inspectorate advises that the ES should include an assessment of operational impacts on cables where significant effects could occur.	
	Cumulative effects on other users The paragraph indicates that 'other users' includes infrastructure and any other uses aside from offshore wind. It states that impacts would be dependent of physical overlap and are likely to be absent or possible to mitigate. The Inspectorate agrees that where no pathway for effect exists that cumulative effects can be scoped out, however, specific impacts and effects are not explored in this paragraph and the Inspectorate considers that where pathways do exist (as identified in Table 73 of the Scoping Report) the likelihood of significant cumulative effects should be assessed in the ES.	Cumulative effects on OMU receptors are included in Section 12.13.
	Figure titled 'Energy infrastructure within the Awel y Mor Study Area'	This has been noted by the Applicant and the figure has been

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	The text of the Scoping Report refers to Figure 67 in relation to existing energy infrastructure, however, the figure with the noted title is not numbered. The key is missing the ECR search area although this appears to be depicted on the Figure. If a corresponding figure is to be included in the ES these points should be addressed. The description of the baseline environment in the Scoping Report mentions a number of existing infrastructure assets and other activities by location and name and it would be useful for any updated figure included in the ES to label those which interact with the proposed development.	updated and labelled as necessary.
29/10/2020 Commercial and recreational fishing update	How surrounding windfarms will be taken into consideration.	See Section 12.13, Cumulative effects.
	Concerns were voiced about the long-term effects from construction and operation on fishing for tope, brill and gurnard (as stakeholders say these species have reduced in abundance since the construction of GyM).	Recreational fishing (including charter angling) has been described in the baseline and assessed throughout the Sections 12.10 to 12.12.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		A detailed characterisation of the recreational fishing baseline is included in Volume 4, Annex 12.1: Recreational Fishing Baseline, which also considers trends in catch.
08/12/2020 Commercial and recreational fishing update	There is a route between GyM and Rhyl Flats which has several fishing marks, known as 'The Rockies' due to the presence of rocky ground. This area should be avoided through micrositing if possible.	Known fishing marks included in the baseline, see Section 12.7. A detailed characterisation of the recreational fishing baseline is included in Volume 4, Annex 12.1: Recreational Fishing Baseline.
	Concern over fishing marks and how they would be approached.	Fishing marks have been collated and collected through the detailed questionnaire provided in the Recreational Fishing Baseline technical annex (Volume 4, Annex 12.1: Recreational Fishing Baseline).

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
April 2021 Poseidon fisheries questionnaire	Full consultation available in Volume 4, Annex 12.1: Recreational Fishing Baseline.	Recreational fishing (including charter angling) has been included in the baseline and assessed throughout the assessment in Section 12.10 to 12.12.

12.3.1 Matters to be scoped in

8 A number of impacts were proposed to be scoped in, in the Scoping Report, these are detailed in Table 3.

Table 3: Impacts scoped into the assessment on OMU.

IMPACT	APPROACH
Impacts on other OWFs	Impacts on other OWFs from the construction, operation and decommissioning of AyM are assessed throughout this chapter in Section 12.10 to 12.12.
Potential impacts on non-OWF cables and pipelines	Impacts on non-OWF cables and pipelines from the construction and decommissioning of AyM are assessed throughout this chapter in Section 12.10 and 12.12.
Potential impact on recreational watersports users	Impacts on recreational watersports users from the construction, operation and decommissioning of AyM are assessed in Volume 3, Chapter 4 and recreational sailing is considered in Volume 2, Chapter 9.
Potential impact on recreational fishing (including charter angling)	Impacts on recreational fishing (including charter angling) from the construction, operation and decommissioning of AyM are assessed throughout this chapter in Section 12.10 to 12.12.

12.3.2 Matters to be scoped out

9 A number of impacts were proposed to be scoped out in the Scoping Report and agreed with PINS due to no spatial overlap of infrastructure at the present time (see Table 2). These impacts are presented in Table 4 alongside justification for scoping them out.

Table 4: Impacts scoped out of assessment for OMU.

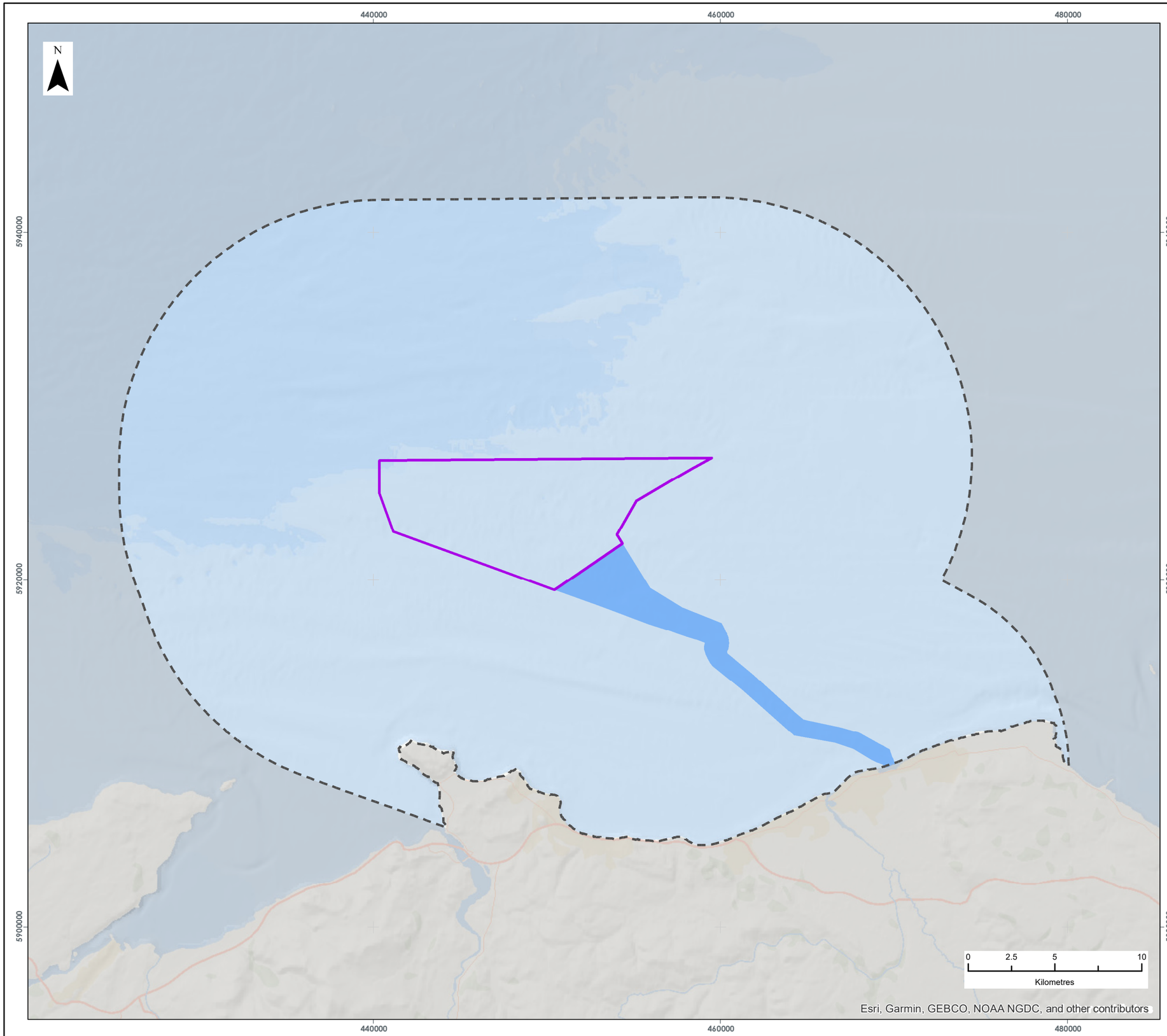
IMPACT	JUSTIFICATION FOR SCOPING OUT
Impacts on wave and tidal	No existing sites overlap with the study area.
Impacts on O&G infrastructure	No existing or planned O&G activities or infrastructure overlap with the study area. Any conflicts with aviation activities, including helicopter operations are assessed in Volume 2, Chapter 13. As agreed with PINS scoping opinion (Table 2).
Impacts on Carbon Capture Usage and Storage	No existing or planned sites overlap with the study area. Cables and pipelines are assessed separately throughout this chapter in Section 12.10 to 12.12.
Impacts on nuclear cooling and intake systems	No existing or planned sites overlap with the study area. As agreed with PINS scoping opinion (Table 2).
Impacts on aggregate dredging	No existing or planned aggregate sites overlap with the study area. As agreed with PINS scoping opinion (Table 2).
Impacts on dumping/disposal sites	No existing or planned active dumping or disposal sites overlap with the study area. As agreed with PINS scoping opinion (Table 2).
Impacts on military areas	No existing or planned MoD areas overlap with the study area. As agreed with PINS scoping opinion (Table 2). Any conflicts with MoD aviation and radar activities are addressed in Volume 2, Chapter 13.

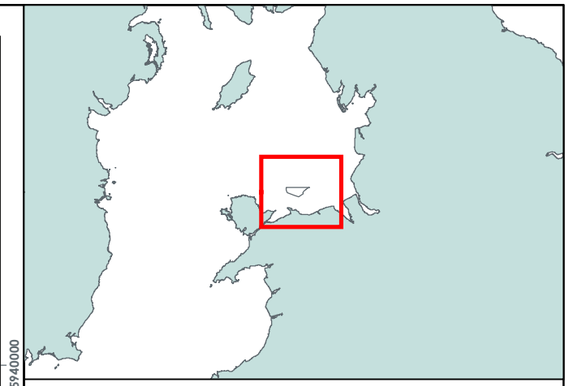
12.4 Scope and methodology

12.4.1 Study area

10 The study area for this assessment is presented in Figure 1 and extends 15 km around the array area and 10 km surrounding the offshore Export Cable Corridor (ECC). This study area is consistent with the definition as presented in the Scoping Report, encompasses the area in which OMU may fall within the project Zone of Influence (ZoI), and is considered adequate for the purposes of undertaking EIA.

11 The study area has been defined as the area encompassing the AyM array area and the ECC search area, up to and including the intertidal zone in Rhyl, defined as ending at Mean High Water Springs (MHWS) and provides a regional overview. The regional approach has been used to establish the wide-ranging nature of recreational activities and angling and helps to evaluate the effects and the consequences of such uses being excluded and or displaced by the construction O&M and decommissioning of the wind farm.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Study Area

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Study Area and Zone of Influence

VER	DATE	REMARKS	Drawn	Checked
1	01/04/2021	For Issue	BPHB	FC

FIGURE NUMBER:

Figure 1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:225,000	A3	WGS84	UTM30N

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AWEL Y MÔR
Offshore Wind Farm

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12.4.2 Data collection

12 A desk-based review of available data sources was undertaken to identify other users and existing infrastructure within the study area. A large amount of contextual information with regard to OMU and fixed infrastructure within the study area is already available, and is provided in Table 5.

13 Consultation with operations and licensing bodies (as required) was also undertaken to establish the current status of known and planned infrastructure and other users within the study area. Existing and planned licences have been identified and a timeline for future activities associated with the existing or planned infrastructure has been established.

Table 5: Data sources for OMU baseline.

TOPIC	YEAR	DATA SOURCE AND SUMMARY	COVERAGE OF AYM AREA STUDAY AREA
Offshore renewables	2020	The Crown Estate offshore wind leasing sites - Rounds 1-4	Full coverage of all licensed activity.
O&G	2019	O&G Authority interactive map of all offshore O&G activity (surface and sub-surface).	Full coverage of all licensed activity.
CCUS and natural gas storage	2019	The Crown Estate The UKs Storage Appraisal Project strategic study of the potential for UK carbon dioxide (CO_2) storage	Full coverage of all licensed activity.
Offshore cables and pipelines	2020	Kingfisher Information Service – Cable Awareness (KISORCA) displays used and abandoned cables and pipeline routes.	Full coverage of all licensed activity.

TOPIC	YEAR	DATA SOURCE AND SUMMARY	COVERAGE OF AYM AREA STUDAY AREA
Disposal sites	2019	Centre for Environment, Fisheries & Aquaculture Science (Cefas) – Disposal Sites	Full coverage of all licensed activity.
Marine aggregate extraction	2020	The Crown Estate Aggregate Licence Area Charts British Marine Aggregate Production Areas (BMAPA) dredger reports	Full coverage of all licensed activity.
MoD	2021	Ocean Wise marine themes – Practice and Exercise Area (PEXAs) Charts	Full coverage.

12.4.3 Methodology

14 The project-wide generic approach to assessment is set out within Volume 1, Chapter 3: Environmental Impact Assessment Methodology. The assessment methodology for the PEIR remains consistent with that provided in the Scoping Report (Innogy, 2020) and no changes have been made since the scoping phase.

15 The assessment of potential impacts on OMU receptors is based on the MDS as identified from the parameters described in Volume 2, Chapter 1: Offshore Project Description. The key parameters informing the MDS for OMU are the layout of the wind farm, the number and size of any offshore structures, the type and size of foundations used as well as the timing and duration of the proposed offshore works (see Section 12.8: Key parameters for assessment for further details).

16 The assessment considers all relevant offshore and coastal activities, marine infrastructure and relevant recreational fishing and angling. Impacts are considered throughout the construction, O&M and decommissioning phases of the proposed development.

17 Cumulative effects have been assessed by taking into consideration future plans, projects and activities (see Section 12.13: Environmental assessment: cumulative assessment) that are in the study area which have the potential to affect the same receptors. Where other developments are fully determined, the effects arising from the developments have been considered as part of the baseline and may also be considered as part of the construction and operation cumulative assessment. Developments forming part of the dynamic baseline and those included in the cumulative assessment are clearly identified in the ES.

12.5 Assessment criteria and assignment of significance

18 The assessment approach used to determine the significance of the effect is a two-stage process that involves defining sensitivity of the receptors and the magnitude of the impacts. This section describes the criteria applied in this chapter to assign values to sensitivity of receptors and the magnitude of potential impacts. The terms used to define sensitivity and magnitude are informed by the EIA Regulations 2017 and the Ministry of Housing, Communities and Local Government's (MHCLG) (formerly the Department for Communities and Local Government (DCLG)). EIA Planning Practice Guidance (DCLG, 2017) has been applied in undertaking the EIA as part of the PEIR.

19 The magnitude of the potential impacts is defined by a series of factors including the spatial extent of any potential interaction, the likelihood, duration, frequency and longevity (temporary or permanent). The definition used within this assessment are shown in Table 6.

Table 6: Impact magnitude definitions.

MAGNITUDE	DEFINITION
High	Total loss of ability to carry on activities. Impact is of extended temporal or physical extent and of long-term duration (i.e. total life of project) and/or frequency of repetition is continuous and/ or effect is permanent.

MAGNITUDE	DEFINITION
Medium	Loss or alteration to significant portions of key components of current activity leading to a reduction in the level of activity that may be undertaken and/ or physical extent of impact is moderate and/ or medium-term duration (i.e. operational period) and/ or frequency of repetition is medium to continuous and/ or effect is permanent for the project phase.
Low	Very slight change from baseline condition and/or physical extent of impact is negligible and/ or short-term duration (i.e. construction period) and/ or frequency of repetition is negligible to continuous and/ or effect is temporary.
Negligible	No discernible change from baseline conditions.

20 The sensitivities (or importance) of OMU receptors are defined by their potential vulnerability to an impact from the proposed development, their recoverability, and the value or importance of the receptor. The definition of terms relating to the sensitivity of OMU receptors is detailed in Table 7.

Table 7: Sensitivity/importance of the environment.

RECEPTOR SENSITIVITY/ IMPORTANCE	DESCRIPTION/ REASON
High	Receptor is of high value or importance, with critical importance to the local, regional or national economy. Receptor is highly vulnerable to impacts that may arise from the project and recoverability is long-term or not possible.
Medium	Receptor is of medium value or importance, with reasonable contribution to the value of the local, regional or national economy. Receptor is moderately vulnerable to impacts that may arise from the project and has moderate to high levels of recoverability.

RECEPTOR SENSITIVITY/ IMPORTANCE	DESCRIPTION/ REASON
Low	Receptor is of minor value or importance with small levels of contribution to the value of the local, regional or national economy. Receptor is not generally vulnerable to impacts that may arise from the project and/or has high recoverability.
Negligible	Receptor is of very low value or importance, with negligible contribution to the value of the local, regional or national economy. Receptor is not vulnerable to impacts that may arise from the project and/or has high recoverability.

21 The assessment of effects on OMU receptors has been determined by correlating the magnitude of the impact against the sensitivity of the receptor. The method employed for this is presented in Table 8. For the purposes of this assessment, any effect that is of 'major' or 'moderate' significance is considered to be significant in EIA terms. Any effect that has a significance of 'minor' or 'negligible' is not considered to be significant in EIA terms. An assessment of the significance of potential effects is described in Sections 12.10 - 12.12.

22 Where relevant, mitigation measures that are incorporated as part of the project design process and/ or can be considered to be industry standard practice (referred to as 'embedded mitigation') are considered throughout the chapter and are reflected in the outcome of the assessment. Mitigation is prescribed only to reduce 'significant effects'. Under EIA guidelines 'moderate' and major' effects are regarded as being significant. Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) are described separately, in Section 12.10 of this chapter.

Table 8: Matrix to determine effect significance.

		SENSITIVITY			
		HIGH	MEDIUM	LOW	NEGLIGIBLE
ADVERSE MAGNITUDE	HIGH	Major	Major	Moderate	Minor
	MEDIUM	Major	Moderate	Minor	Negligible
	LOW	Moderate	Minor	Minor	Negligible
	NEGLIGIBLE	Minor	Minor	Negligible	Negligible
BENEFICIAL MAGNITUDE	NEGLIGIBLE	Minor	Minor	Negligible	Negligible
	LOW	Moderate	Minor	Minor	Negligible
	MEDIUM	Major	Moderate	Minor	Negligible
	HIGH	Major	Major	Moderate	Minor

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

12.6 Uncertainty and technical difficulties encountered

23 Baseline data has been prepared to inform the impact assessments and are prepared with the best available data at the time. However, the data and charts used are considered appropriate and sufficient for the purposes of the assessment.

12.7 Existing environment

24 Information on the OMU baseline within the study area was collected through a detailed desktop review of existing studies and datasets (as identified in Section 12.1.1), through consultation (as identified in Section 12.3) and through the use of GIS.

25 The baseline existing environment presented in this Section is based on the current condition and an indication of how each of these aspects is expected to develop if the project was not to proceed is given in Section 12.7.2.

26 A technical report has been produced in order to understand the current baseline for recreational fishing and is available in Volume 4, Annex 12.1: Recreational Fishing Baseline. A review of the key findings from that study has been incorporated into the description of the existing environment.

Offshore wind farms

27 There are a number of operational wind farms within the Irish Sea region with a combined total capacity of 2,731 MW. The closest sites are presented in Figure 2 and Table 9 and include GyM OWF, North Hoyle OWF, Rhyl Flats OWF and Burbo Bank and Burbo Bank extension OWF. In addition, there are six additional OWFs situated in the Irish Sea Region more than 30 km away (Table 9). There is no spatial overlap of any other OWFs within the AyM array area, however there is a spatial overlap with other wind farm export cables and the AyM ECC. The AyM interlink cabling will overlap with the GyM array and may require up to one crossing with a GyM array cable in order to facilitate connection to a GyM Offshore Substation Platform (OSP) via subsea cabling (see in Figure 2 and Table 9).

28 AyM offshore export cables will need to cross the export cables of: GyM OWF and North Hoyle OWF, both of which run south, making landfall along the North Wales coast. The offshore ECC runs close to the Burbo Bank OWF extension export cable, however, will not cross it. It should be noted that the GyM and Burbo Bank extension OWF export cables are operated by Offshore Transmission Owners (OFTOs) and are therefore classed as separate types of infrastructure (transmission infrastructure) to the OWF array areas (which are categorised as generation infrastructure).

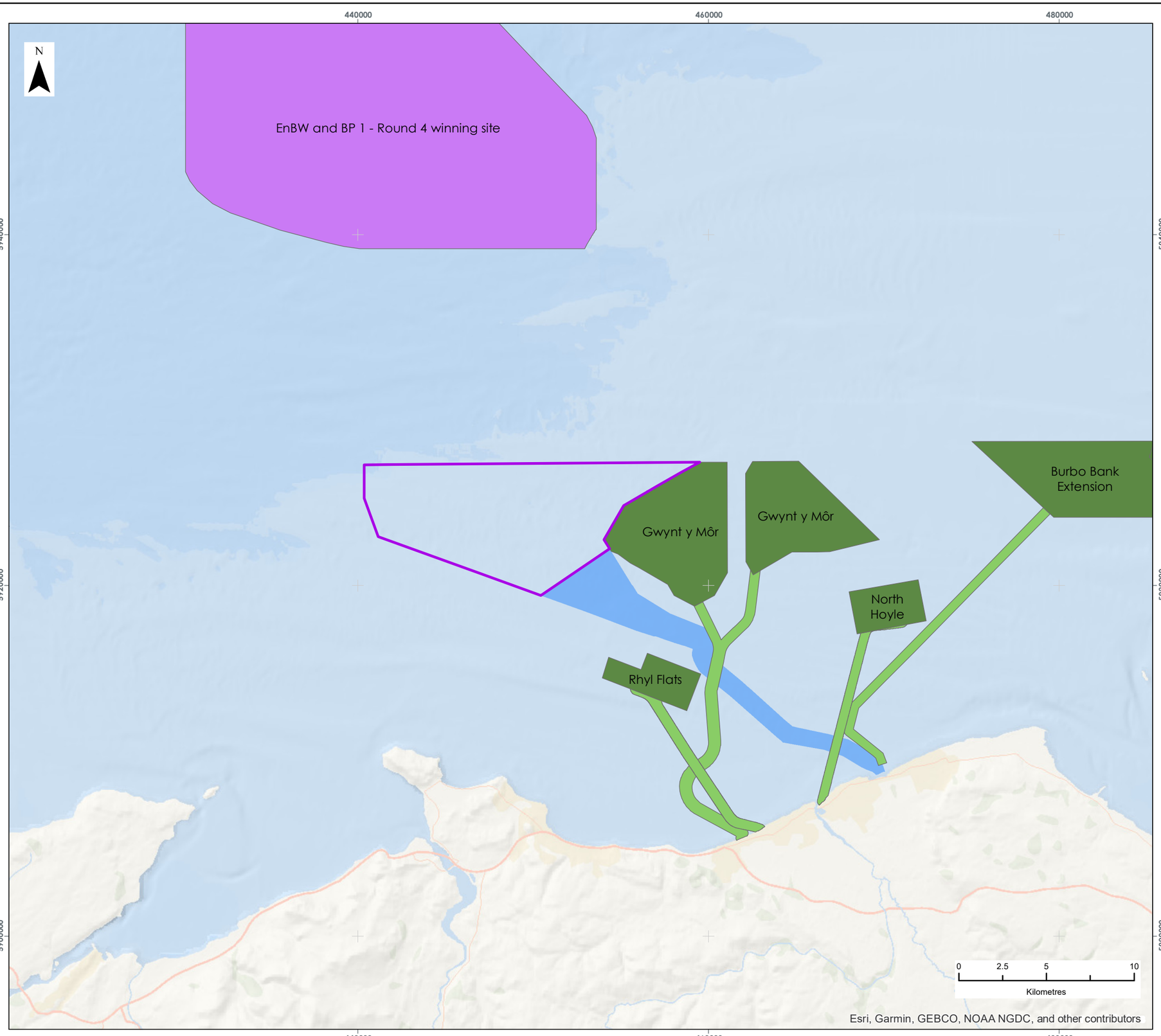
29 Four bidding areas for leasing under the Crown Estate (TCE) Round 4 were released in September 2019. The North Wales and Irish Sea Bidding Area comprises the North Wales and Irish Sea Region and the northern part of the Anglesey region and covers an area of approximately 8,500 km^2. The Offshore Wind Leasing Round 4 tender process has now concluded, three projects in the North Wales and Irish Sea Bidding Area are being progressed to the Plan-Level Habitats Regulations Assessment (HRA) (The Crown Estate, 2021) and are presented in Figure 2 and Table 9.

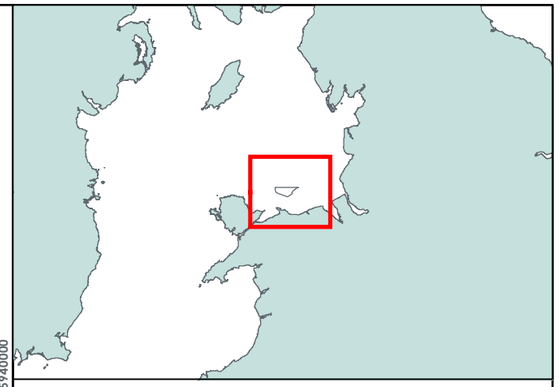
Table 9: Offshore Wind Farms in the Irish Sea Region.

OWF	CAPACITY (MW)	OPERATOR/ OFTO	DISTANCE FROM AYM ARRAY (KM)	DISTANCE FROM AYM ECC (KM)
Operational				
GyM array	576	Innogy	0	0 (interlink cable extends from AyM array into GyM array)
GyM export cables		Balfour Beatty Plc	5.8	0 (crossing required)
Rhyl Flats array	90	RWE Renewables	5.2	7.3
Rhyl Flats export cables			2.8	0.08
North Hoyle array	60	RWE npower renewables	13.8	6.7
North Hoyle export cables			15.1	0 (crossing required)
Burbo Bank extension array	259	Ørsted	15.5	16.8
Burbo Bank extension export cables		Diamond Transmission Partners	16.4	0 (no crossing required)
Burbo Bank array	90	Ørsted	25.6	23.1

OWF	CAPACITY (MW)	OPERATOR/ OFTO	DISTANCE FROM AYM ARRAY (KM)	DISTANCE FROM AYM ECC (KM)
Burbo Bank export cables			28.7	23.0
West of Duddon Sands array	389	Ørsted	51.2	57.2
West of Duddon Sands export cables		Frontier Power	57.8	64.0
Walney Extension (3 & 4) array	659	Ørsted	57.0	62.7
Walney Extension (3 & 4) export cables		Diamond Transmission Partners	49.6	55.4
Barrow array	90	Barrow Offshore Wind Limited	57.6	64.1
Barrow export cables		Transmission Capital Services	59.4	66.0
Walney 1 array	184	Walney (UK) Offshore Windfarms Ltd	58.3	64.0
Walney 1 export cables		Frontier Power	60.7	66.9
Walney 2 array	184	Walney (UK) Offshore Windfarms Ltd	61.0	66.4

OWF	CAPACITY (MW)	OPERATOR/ OFTO	DISTANCE FROM AYM ARRAY (KM)	DISTANCE FROM AYM ECC (KM)
Walney 2 export cables		Frontier Power	53.8	60.8
Ormonde array	150	Ormonde Energy Limited	65.4	71.3
Ormonde export cables		Transmission Capital Services	62.0	68.7
Round 4 Projects progressed to Plan-Level HRA				
EnBW and BP 1	1,500	Consortium of Energie Baden-Württemberg AG (EnBW) and BP	12	17
Cobra and Flotation Energy	480	Offshore Wind Limited, a Joint Venture between Cobra Instalaciones y Servicios, S.A. and Flotation Energy plc	28	34
EnBW and BP 2	1,500	Consortium of EnBW and BP	46	53





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Early Planning Offshore Wind Farm
- Operational Offshore Wind Farm
- Operation Offshore Wind Farm Cable

Data Source:
Wind Farm data from The Crown Estate

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Offshore Wind Farms and their associated export cables

VER	DATE	REMARKS	Drawn	Checked
1	16/04/2021	For Issue	BPHB	FC

FIGURE NUMBER:

Figure 2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:225,000	A3	WGS84	UTM30N

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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Wave and tidal

30 There are a number of wave and tidal renewable energy projects and demonstration zones along the North Wales coastline. There are five main schemes in North Wales which are at various stages of design and development.

31 There are two operating wave and tidal projects which fall outside of the AyM array and ECC. These are the West Anglesey Tidal Demonstration Zone (known as Morlais) and the Minesto Deep Green tidal project. Morlais is leased to Menter Môn and is located around Holy Island, 55 km to the west of the array with associated cables and substation inshore near the South Stack. Just to the west of this is the Minesto Deep Green tidal project, which is a commercial scale demonstration site commissioned in 2018 and has a 10 MW array operating 20 m below the surface. It is located within the Holyhead Deep site, 60 km to the west of the AyM array, 8 km off Anglesey coast outside of the AyM array and ECC.

32 North Wales Tidal Energy now have an area of interest, through their proposed North Wales Tidal Lagoon, which stretches 30 km, from Llandudno to Prestatyn covering an area of 157 km^2 with the exact location currently in research (Marine Energy Wales, 2021). The project overlaps with the ECC but is still in very early development with funding required to validate the viability of the project and therefore, remains a concept rather than a formal proposal of material consideration at this stage.

33 Feasibility and engagement work was commenced but has since stalled on a second project that falls within the ECC (Tidal Lagoon Power, 2021). This was a project considered by Tidal Lagoon Power, who identified opportunities for a project in Colwyn Bay.

34 There are also plans for another tidal lagoon, developed by Mostyn SeaPower, stretching from the breakwater at Mostyn to Point of Ayr and an application is due to be submitted by the end of 2022 (Port of Mostyn, 2020).

35 As identified in Table 4, there is no current overlap with any active sites with AyM and therefore impacts on wave and tidal have been scoped out from further assessment as agreed with PINS (see Table 2).

Oil and gas infrastructure

36 There are five offshore O&G fields present in the region. The Liverpool Bay Development, currently operated by ENI UK Limited comprises four oil and gas platforms located in the Irish Sea:

- Douglas (manned);
- Hamilton (unmanned);
- Hamilton North (unmanned); and
- Lennox (unmanned).

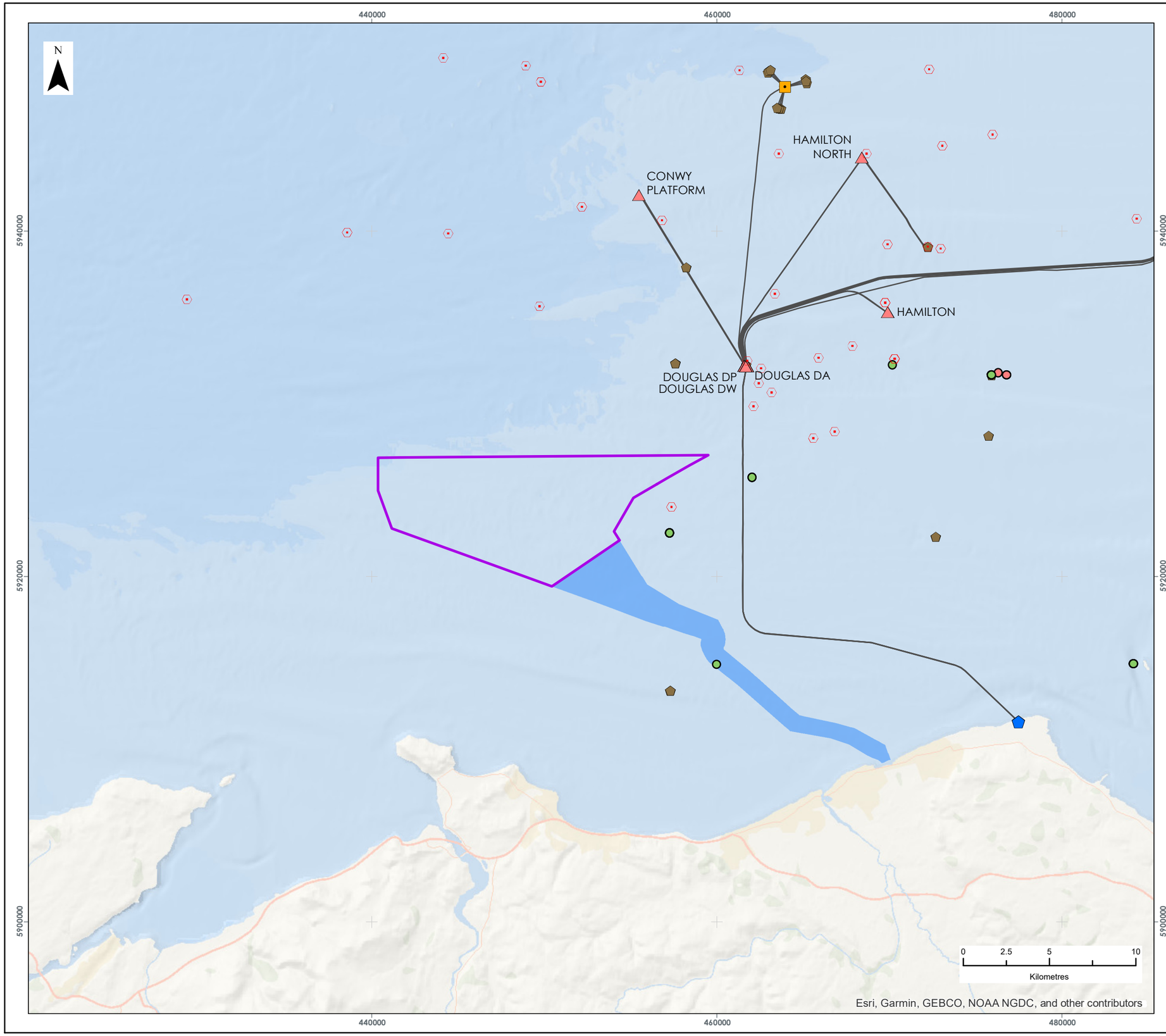
37 The Douglas O&G field is a three-platform facility (also known as the Douglas Complex) and receives O&G extracted from the three other ENI, unmanned fields, in the Liverpool Bay Development (Hamilton, Hamilton North and Lennox). There is also a fifth O&G field present in the region, which is the Conwy platform operated by Tailwind. These are supported by numerous offshore and onshore facilities for extracting, transporting and processing reserves.

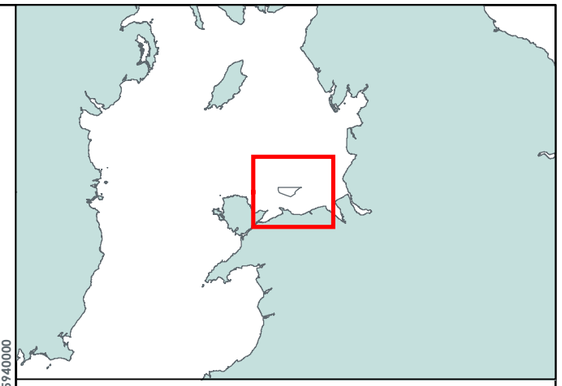
38 The Liverpool Bay Development and infrastructure (surface and subsurface) lie to the north east of the study area, the closest asset is a wellhead located approximately 1.5 km from AyM within the boundary of GyM OWF. The Douglas Complex platforms are approximately 5.5 km to the north east of AyM and transport gas extracted from Hamilton and Hamilton North is transported by a pipeline to a gas processing terminal at Point of Ayr on the North Wales coast. The Conwy field's platform lies 15 km (see Figure 3) to the north of AyM and transports oil extracted to the Douglas Complex which supports the Field's development. The pipeline which transports O&G from the Douglas Complex to shore, leaves the Douglas Complex, runs south intersecting the GyM array before running east towards the coast, as shown in Figure 3 (more information on subsea cables and pipelines in paragraph 51 *et seq.*).

39 The Douglas Complex, together with the satellite platforms of Lennox, Hamilton and Hamilton North are protected by a 500 m shipping exclusion zone, monitored by radar and patrolled 24 hours a day, by one of the development's three support vessels. Further details on the shipping and aviation traffic associated with the O&G industry are discussed in Volume2, Chapter 9 and Volume 2, Chapter 13 respectively.

40 New blocks awarded under the recent licensing rounds (31st round), are to the north of the array within the central Irish Sea. There is no overlap with the AyM array or ECC with any existing or provisional licence blocks, or wells (live or abandoned).

41 The ECC has been designed to avoid any spatial overlap with the gas pipeline terminating at Point of Ayr on the North Wales coast (see Figure 3), further information provided in paragraph 51 *et seq.* and Volume 1, Chapter 4.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Oil and Gas Subsurface Feature
- Wellhead

Oil and Gas Surface Features

- Buoy, Active
- Buoy, Removed
- FPSO, Active
- Platform, Active
- Terminal, Active

Data Source:
Oil and Gas data from the Oil and Gas Authority (OGA) and Marine Themes

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Oil and Gas Infrastructure

VER	DATE	REMARKS	Drawn	Checked
1	16/04/2021	For Issue	BPHB	FC

FIGURE NUMBER:

Figure 3

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
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AWEL Y MÔR
Offshore Wind Farm

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Gas and storage project

42 An agreement for Lease (AfL) with TCE has been awarded for the Gateway Gas Storage Facility that covers offshore rights in the east Irish Sea for the development of a 1.5 billion cubic meters (BCM) salt cavern gas storage facility. It is proposed that natural gas is stored in artificially created salt caverns connected to the shore at Barrow-in-Furness via a pipeline.

43 No development activities have taken place to date and the proposed project is located in the east Irish Sea, with no spatial overlap with AyM array or ECC. Therefore, any potential impacts on this receptor have been screened out from further assessment as identified in Table 4.

Carbon Capture Usage and Storage

44 As part of the UK's Storage Appraisal Project (UKSAP), a strategic study of the potential for UK carbon dioxide (CO_2) storage was undertaken which examined the potential for storage in UK waters (Pale Blue Dot Energy, 2016). A number of sites were identified as having potential and five were taken forward across the UK, including the Hamilton depleted gas field in the Irish Sea, which lies approximately 25 km to the north east of the study area. This site was identified as having potential over a 25-year period, to accommodate the injection of 125 MT of CO_2. The Hamilton reservoir is configured in a faulted structure around 2.5 km wide, 10 km long and a crest 700 m below sea level (bsl).

45 Eni were awarded a CO_2 appraisal and storage licence in the East Irish Sea for the HyNet North West project by the Oil and Gas Authority (OGA) in October 2020; the first carbon capture usage and storage (CCUS) project in the UK (Eni, 2021). A final investment decision could follow in 2023 leading to first injection as soon as 2025 (HyNet, 2020).

46 Under the licence, Eni plan to reuse and repurpose depleted hydrocarbon reservoirs and their associated infrastructure to permanently store CO_2 captured in the north west of England and North Wales. The existing plans propose the re-use of the Hamilton gas field infrastructure (the Hamilton, Hamilton North and Lennox fields) which is approximately 12 km to the north east of AyM, to allow decommissioning of the site.

47 The North and South Morecambe fields were also identified in the UKSAP study but were not recommended as part of the initial five sites portfolio to be progressed. Both fields are located in the East Irish Sea, approximately 40 km north of the Hamilton site with no overlap with the AyM study area.

48 There is no overlap with the AyM array or ECC, and therefore impacts on CCUS have been scoped out from further assessment, as identified in Table 4. Cables and pipelines are assessed separately throughout this chapter in Section 12.10 to 12.12.

Nuclear power

49 Three nuclear power stations border the Irish Sea: Heysham in Morecambe, Sellafield and Calder Hey on the Cumbrian coast. There is no overlap with any onshore or offshore infrastructure within the study area, the closest is Heysham, over 77 km away. There will be no interaction with any infrastructure that could result in impacts on or from these facilities.

50 The Wylfa nuclear facility located on Anglesey ceased generation in 2015 and is currently being decommissioned. A Development Consent Order (DCO) application was submitted by Horizon Nuclear Power in June 2018 for the new Wylfa Newydd site, located adjacent to the former power station. The proposed project components included a power station including two nuclear reactors, a marine offloading facility, cooling water intake and outfall structure and associated onsite infrastructure. In January 2019 work was suspended following difficulties reaching an agreement on the financing and associated commercial agreement. Planning permission was deferred in October 2019 and the application was withdrawn in January 2021 (PINS, 2021).

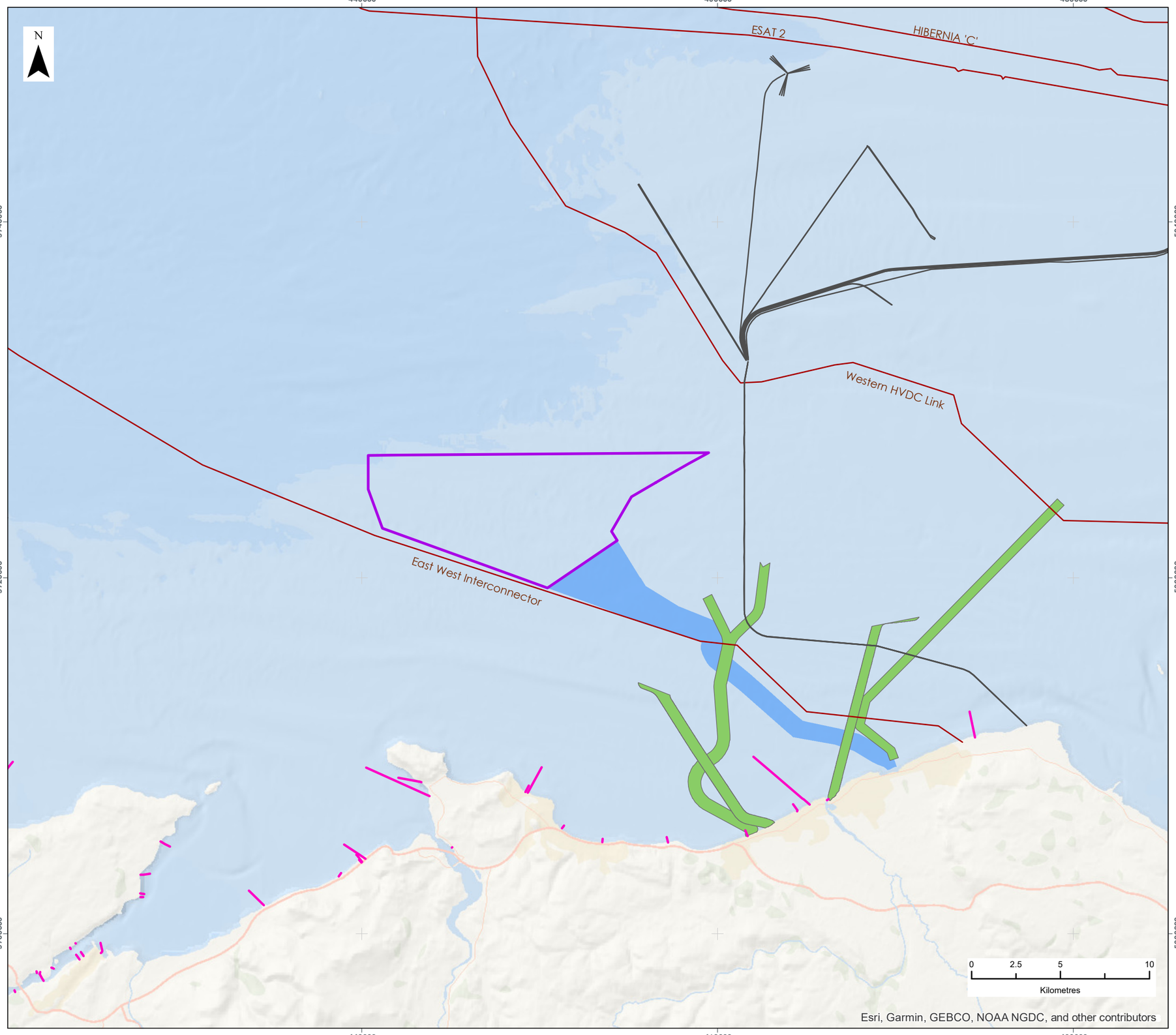
51 There are no existing or planned sites which overlap with the AyM array area or ECC, and therefore any potential impacts on nuclear power have been screened out from further assessment as agreed in the scoping opinion (see Table 2) and identified in Table 4.

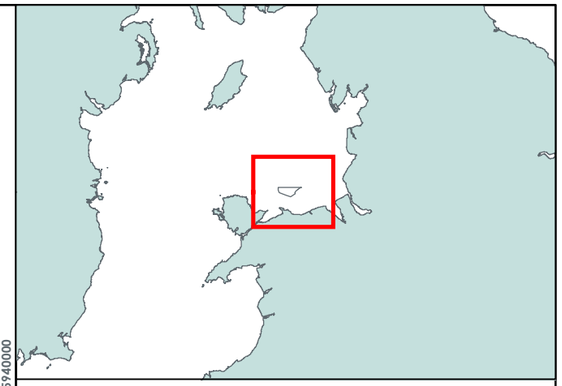
Subsea cables and pipelines

52 There are numerous active cables which intersect the southern and eastern areas of the Irish Sea region. Existing cable infrastructure lies outside of the AyM array draft order limits, with some intersecting and crossing the AyM ECC as presented in Figure 4. Note that OWF export cables are considered within the 'offshore wind farms' existing environment section, see paragraph 1 *et seq*.

53 The Eirgrid East-West Interconnector shown in Figure 4 connects Arklow, County Dublin in Ireland to Prestatyn, Wales. It runs parallel to the south-western boundary of the AyM array and intersects the ECC, and the AyM export cables will need to cross it.

54 A gas pipeline runs from the Douglas Complex offshore fields in the Liverpool Bay Development to the Point of Ayr (Flintshire) (as identified in Paragraph 35 *et seq.*) which lies immediately adjacent (400 m) to the east of the ECC (see Figure 4) but does not overlap and therefore, no crossing of the assets will be required.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Subsea Cables
- Oil and Gas Pipelines
- Offshore Wind Farm Cables
- Outfall Pipes

Data Source:
Subsea Cables Data from Kis Orca EMODnet © EMODnet - Human Activities.
Wind Export Cables from The Crown Estate © Crown Copyright
Outfall Pipes from Marine Themes

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Subsea Cables and Pipelines

VER	DATE	REMARKS	Drawn	Checked
1	04/05/2021	For Issue	BPHB	FC

FIGURE NUMBER:

Figure 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
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Offshore Wind Farm

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Aggregate dredging

55 Extensive sand and gravel extraction operations have taken place in Liverpool Bay since 1959. Currently, there are three licenced aggregate areas (as presented in Figure 5) in close vicinity to the Project, however none overlap with the array or ECC. These three production areas are:

- Area 457: operated by Westminster Gravels Ltd;
- Area 392: operated by Tarmac Marine Ltd; and
- Area 393: operated by Northwest Sands and Ballast Company.

56 Consultation with the operators to determine impacts on vessel routing to the landing ports at the Liverpool wharves and Penrhyn, has informed the Shipping and Navigation assessment (see Volume 2, Chapter 9), and is therefore not considered in this chapter. There are currently no application areas for mineral extraction within the North-West region.

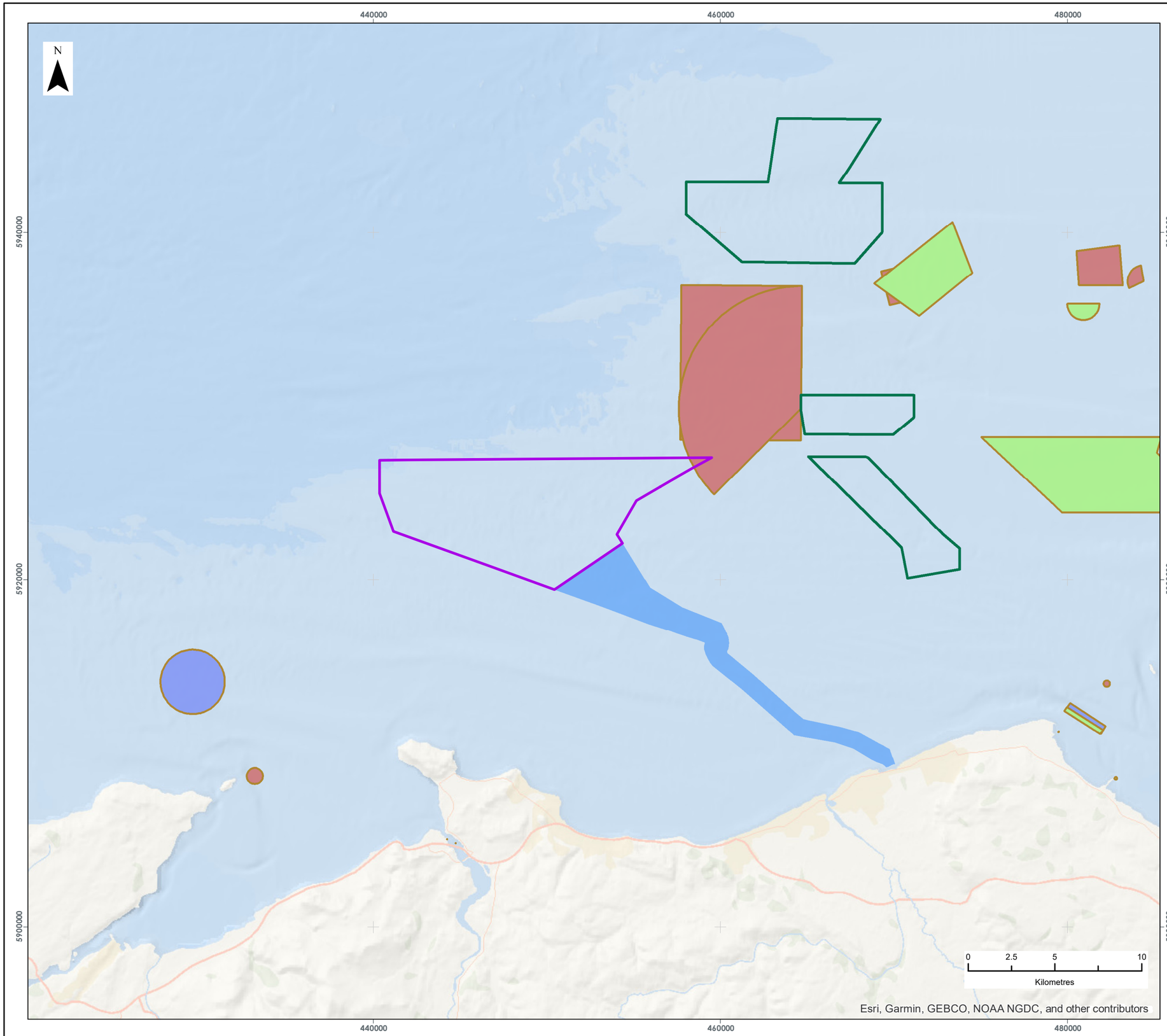
57 It is not anticipated that the construction, O&M or decommissioning of AyM OWF would impact any existing production or application areas for aggregate extraction given the lack of any spatial overlap and therefore, in the absence of a meaningful impact-receptor pathway, it is proposed that any potential impacts on this receptor are screened out from further assessment as agreed in the scoping opinion (see Table 2) and identified in Table 4.

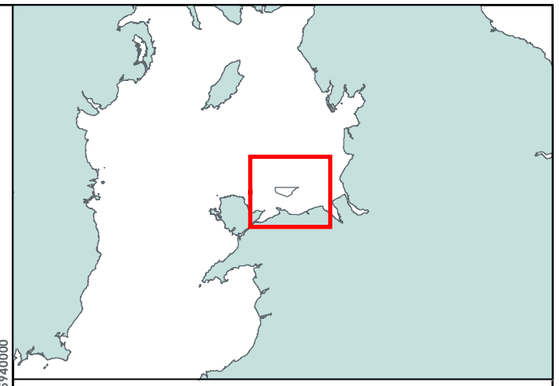
Dumping / disposal sites

58 Historically, significant quantities of material have been disposed of in Liverpool Bay. Material from the Mersey Docks has been deposited in the Mersey Estuary since 1825 and in Liverpool Bay since 1874. Dredged material is at present the major material disposed of in the Irish Sea. The quantities of disposal each year vary significantly depending on the requirements associated with harbour and marine dredging from the Liverpool and Birkenhead docks and the approach channel to the river Mersey.

59 The main open sites are Site Y (IS150), 13.7 km to the north east of the array and Site Z (IS140) 15.5 km to the north east of the array and are presented in Figure 5. The very eastern draft order limits of the array overlaps with the Liverpool Bay (sludge) B site, which received sewage sludge and industrial waste up until 1998 and is now closed. The licenced disposal sites for Burbo Bank extension and GyM are also now closed, and do not overlap with the array or ECC.

60 Due to the lack of direct overlap of any open sites for dredging and/or disposal with the AyM array or ECC, and therefore a lack of meaningful impact-receptor pathway, any potential impacts on this receptor have been screened out from further assessment as agreed in the scoping opinion (see Table 2) and identified in Table 4.





LEGEND

- Array Area
- Offshore Export Cable Corridor
- Aggregate Area

Disposal Site (Status)

- Open Disposal Site
- Closed Disposal Site
- Disused Disposal Site

Data Source:
Disposal Sites data from CEFAS,
Aggregates data from The Crown Estate

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

Aggregates and Disposal Sites

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1	16/04/2021	For Issue	BPHB	FC

FIGURE NUMBER:

Figure 5

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
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AWEL Y MÔR
Offshore Wind Farm

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Military areas

61 A summary of MoD activities is presented in this section, with further information provided in Volume 2, Chapter 13. The nearest military aviation installation is located at BAE Warton, with radar installations in the region located at Walton and St Annes, both of which are over 50 km from the AyM array and ECC.

62 There is no overlap with known PEXAs and there is no navy or air force exercise areas in the Liverpool Bay area. There is a single army exercise area, X5306 at Altcar, used for grenade and rifle firing, this lies approximately 33 km to the east of the array, and is therefore outwith the potential ZoI of the proposed development. Military and low flying aircraft, and the potential impacts on associated military aircraft are considered in detail in Volume 2, Chapter 13.

63 The possibility of unexploded ordnance (UXO) and munitions in the marine environment generally arises from a number of sources including German WWII air raids, wrecks of armed vessels sunk during conflict, WWII defence sea minefields, military ranges and munition dumping areas. Confirmed munitions have been encountered as part of construction of the GyM OWF, and therefore it has been considered that there is potential for UXO to be encountered on the seabed in AyM, further details are in Section 1.6.4 of Volume 2, Chapter 1: Offshore Project Description.

64 There is no existing or planned overlap with the AyM array or ECC and therefore any impacts on military areas have been screened out from further assessment as agreed in the scoping opinion (see Table 2) and identified in Table 4. Any conflict with aviation activity is assessed within Volume 2, Chapter 13.

Recreational fishing (including charter angling)

65 A detailed characterisation of the recreational fishing baseline is included in Volume 4, Annex 12.1: Recreational Fishing Baseline, with a summary provided here. This PEIR chapter should therefore be read alongside the detailed characterisation annex.

66 Recreational fishing in the areas includes shore anglers, private boat anglers and charter boat operators. Private boat angling is widespread across Liverpool Bay but centres on or around launch sites, moorings and marinas. Private boat angling tends to be trailer launched with boat owners using moorings, marinas and harbour facilities that enable quick launching and safe storage during the months of more frequent fishing activity. The smaller boats used by private owners generally operate between 3-5 km offshore, with little overlap with the AyM ECC.

67 The region has been renowned for angling, particularly for key prize species including tope and gurnards. National federation competitions have been regularly held in the area, as well as the World Angling Competition in 2018. This is an annual event which is hosted by a participant nation each year, with previous years being hosted in South Africa, Ireland and the Netherlands (North Wales, 2018). This year (2021), the competition will be held in Portugal. North Wales continues to be one of the most popular destinations for boat-based sea angling nationally, with Llandudno hosting one of the Wales Federation of Sea Angling competitions in 2021.

68 Feedback from the consultation with anglers indicated the perception that there has been a decline in catches (see Volume 4, Annex 12.1: Recreational Fishing Baseline), however it should be noted that despite the feedback received, North Wales continues to be popular for boat-based sea angling nationally. It has been observed that more widely across the Irish Sea, tope populations are in decline (National Museums Northern Ireland Habitas, 2021) and off the coast of Ireland anglers have reported declines in tope catches from the 1960s (Fitzmaurice *et al.*, 2003). While gurnard size and age distributions off the North Wales coast have varied over time, during the period 1998-2016 there has been no meaningful change in average length or weight (McCarthy *et al.*, 2018). Conversely, over the same period, there has been a notable increase in commercial fishing activity for gurnard, and it is possible that any decline in angling catch could be attributable to an increase in (commercial) inshore fishing in recent years.

69 Charter boats are vessels that can be hired by recreational anglers for fishing trips. These vessels are larger than privately owned angling boats, and operate at a greater distance offshore, typically between 16-20 km from their operational bases and sometimes further afield. There are a number of registered charter companies in North Wales, including those that operate out of the Anglesey ports of Holyhead, Beaumaris and Amlwch, the Gwynedd ports of Conwy, Porthmadog, Colwyn Bay and Rhyl. There are also a number of charter companies operating out of the Dee and Mersey.

70 Recreational sea anglers in Wales specified their top three target species while fishing on their specified platform (e.g. shore, kayak, charter boat). For charter boat fishing, the top three targeted species were: bass, tope and black bream. In the same study, charter vessel skippers ranked rays as the top preference species of their customers, followed by mackerel and then pollack (Monkman *et al.,* 2015).

71 During consultation it was noted that target species and catches vary seasonally and depend on the nature of the fishing trip. Charter angling is understood to take place from May through to October although wider angling activity continues throughout the winter.

72 Figure 3-11 of Volume 4, Annex 12.1: Recreational Fishing Baseline presents the annual charter boat intensity derived from survey data collected in 2003 and 2004. While Figure 3-12 of Volume 4, Annex 12.1: Recreational Fishing Baseline shows charter vessel activity as mapped in 2014. Consultation has identified that charter vessels do routinely fish in the study area, and within the AyM array area and ECC. Various grounds and wreck marks are targeted, with activity throughout the year and some seasonal increases peak charter vessel activity between June and October. Some charter vessel skippers also confirmed that they fish within the adjacent operational wind farms of Rhyl Flat and GyM. Consultation previously undertaken for the GyM OWF identified fishing "marks" (wrecks and rocky outcrops) between Puffin Island and Anglesey.

73 It should be noted that the baseline for commercial fisheries is included in Volume 2, Chapter 8 along with the assessment of impacts.

12.7.2 Evolution of the baseline

74 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that 'a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge' is included within any ES.

75 It is for this reason that AyM has included a description of the evolution of the baseline conditions of OMU receptors in the event that it does not go forward. This reflects changes in the baseline that might be expected from natural variation (e.g., natural changes in habitat condition etc.) and other external factors in the absence of AyM.

76 It is not possible to fully forecast the future baseline with regards other developments that may come forward in the predicted lifetime of the proposed AyM development (>25 years) beyond the projects, plans and activities that have been identified as forthcoming within the reasonably foreseeable future. It could be assumed that over the 25-year period future aggregate extraction rounds may seek to exploit the areas of sand and gravel within the current AyM draft order limits, or that future developers seek to exploit the recognised wind resource present and put forward alternative OWF developments. As these assumed future developments are beyond the scope of any current marine plans, it is considered that they are not reasonably foreseeable, and there is an absence of any relevant environmental information with which to undertake a meaningful assessment. As such, for the purposes of assessment, it is predicted that the future baseline for OMU would remain the same as the current baseline outlined above in Section 12.7 of this chapter.

12.8 Key parameters for assessment

77 This section describes the MDS parameters on which the OMU assessment has been based. These are the parameters which are judged to give rise to the maximum levels of effect for the assessment undertaken as set out in Volume 2, Chapter 1: Offshore Project Description. Should AyM be constructed using different parameters within the design envelope, then the impacts would not be any greater than those set out in this PEIR using the MDS presented in Table 10.

Table 10: Maximum design scenario.

POTENTIAL EFFECT	MAXIMUM DESIGN SCENARIO ASSESSED	JUSTIFICATION
CONSTRUCTION		
Impacts on other OWFs	Maximum number of construction vessels: 91 Round trips: 624 Construction duration: 36 months Construction safety zones: 500 m Number of export cable circuits: 2 Cable crossing technique: rock armour, concrete mattress, steel bridging/ducting, Cable Protection System (CPS) ducting, concrete bridging or rock bags.	This represents the maximum duration and extent of exclusion throughout the construction phase and hence the greatest potential for displacement.
Potential impacts on non-OWF cables and pipelines	Construction duration: 36 months Construction safety zones: 500 m Number of export cable circuits: 2 Cable crossing technique: rock armour, concrete mattress, steel bridging/ducting, Cable Protection System (CPS) ducting, concrete bridging or rock bags.	This represents the maximum duration and extent of exclusion throughout the construction phase and hence the greatest potential for displacement

POTENTIAL EFFECT	MAXIMUM DESIGN SCENARIO ASSESSED	JUSTIFICATION
Potential impact on recreational fishing (including charter angling)	Impacts to target fish and shellfish species: Refer to MDS table in fish and shellfish (Table 9 of Volume 2, Chapter 6: Fish and Shellfish Ecology). Maximum number of construction vessels: 91 Return trips: 3,961 Construction duration: 36 months Construction safety zones: 500 m	The MDS presented in Volume2, Chapter 6: Fish and Shellfish Ecology provide for the greatest disturbance to fish and shellfish species and therefore the greatest knock-on effect to recreational fishing (including charter angling). Importantly, this considers the impacts as a whole on recreationally important species as considered in the MDS for the fish and shellfish chapter, rather than any one impact in particular. This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential for displacement.
OPERATION		

POTENTIAL EFFECT	MAXIMUM DESIGN SCENARIO ASSESSED	JUSTIFICATION
Potential impacts on cables	Major component replacement: Up to 264 events requiring jack-up vessel (JUV) activity Export cable repairs: Up to 4 events Safety Zones: 500 m safety zones around manned offshore platforms and temporary 500 m safety zones around turbines and offshore platforms undergoing major maintenance. Operational duration: 25 years	This represents the maximum duration and extent of exclusion throughout the O&M phase and hence the greatest potential to restrict access to the cables.
Potential impact on recreational fishing (including charter angling)	Wind Turbine Generators (WTGs): 91 OSPs: 2 Met Masts: 1 Permanent Vessel Moorings (PVMs): 3 Major component replacement: Up to 264 events requiring JUV activity Array cable repairs: up to 6 events Export cable repairs: Up to 4 events Safety Zones: 500 m safety zones around manned offshore platforms and temporary 500 m safety zones	This represents the maximum duration and extent of angling throughout the O&M phase and hence the greatest potential to restrict access to angling grounds. It comprises the maximum physical presence of infrastructure on the seabed plus maintenance activities throughout the O&M period, including potential safety zones.

POTENTIAL EFFECT	MAXIMUM DESIGN SCENARIO ASSESSED	JUSTIFICATION
	around turbines and offshore platforms undergoing major maintenance. Operational duration: 25 years	
DECOMMISSIONING		
Impacts on other OWFs	MDS is identical to (or less than) that of construction phase.	MDS is assumed to be as per the construction phase, with all infrastructure removed in reverse-construction order. The removal of cables is considered the MDS, however the necessity to remove cables will be reviewed at the time of decommissioning.
Potential impacts on non-OWF cables and pipelines		
Potential impact on recreational fishing (including charter angling)		
CUMULATIVE EFFECTS		
Potential impact on recreational	Presented in Section 12.13 (Table 16)	

12.9 Embedded mitigation

78 Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) and that are relevant to OMU are listed in Table 11. General mitigation measures, which would apply to all parts of the project, are set out first. Thereafter mitigation measures that would apply specifically to OMU issues associated with the offshore project.

Table 11: Embedded mitigation relating to OMU.

PARAMETER	MITIGATION MEASURES EMBEDDED INTO THE PROJECT DESIGN
GENERAL	
Project design	The development boundary selection was made following a series of constraints analyses, with the array area and offshore ECC route selected to ensure the impacts on the environment and OMUs are minimised.
Cable Specification and Installation Plan (CSIP)	Development of, and adherence to, a Cable Specification and Installation Plan (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 effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed Cable Burial Risk Assessment (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 will be Conditioned in the Marine Licence.
Advanced vessel warnings	Details of AyM will be promulgated in advance of, and during construction, O&M and decommissioning, via Notices to Mariners (NtMs) and the Kingfisher bulletin to ensure mariners are aware of the ongoing works.

PARAMETER	MITIGATION MEASURES EMBEDDED INTO THE PROJECT DESIGN
Safety zones	Safety zones of up to 500 m will be sought during construction, substantial maintenance activities (such as major component replacement) and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with safety zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, maintenance and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards.
Cable crossing agreements	Crossing and proximity agreements with known existing pipeline and cables operators will be sought.

12.10 Environmental assessment: construction phase

79 This section addresses the site clearance and construction phase impacts, through reference to the MDS presented in Table 10.

12.10.1 Impacts on other offshore wind farms

80 The construction activities and vessel movements during the construction of AyM have the potential to affect the O&M activities of other OWFs in the area. The construction activities of AyM have the potential to have an impact on the O&M activities of other OWFs in the area through:

- Increased vessel traffic; and
- Physical overlap of infrastructure.

Increased vessel traffic

81 The construction of AyM will have minimal effects in terms of disruption to passing traffic (see Volume 2, Chapter 9), however the maintenance vessels for other OWFs (GyM, Rhyl Flats, Burbo Bank extension and North Hoyle) are operated out of the Port of Mostyn, to the east of the AyM draft order limits, and could pass close to, or through the AyM draft order limits. Cable installation vessels installing the GyM interlink cables will also need to be present within the GyM Order Limits.

82 A maximum of 91 vessels may be present on site at any one time with a total of 3,961 vessel movements throughout the construction phase (of 36 months). The larger installation vessels (such as JUVs), transport barges and cable laying vessels are likely to transit directly to site from the construction ports (turbine, cable, foundation etc.) with some smaller Crew Transfer Vessels (CTVs). The O&M port for AyM is currently unknown, however it is assumed, as a worst-case scenario that this could be the port of Mostyn.

83 The effect is considered to be short to medium-term (throughout the 36-month construction phase) of local extent, intermittent and reversible. The magnitude of the impact is therefore considered to be **negligible adverse**.

84 The O&M for other OWF assets in the area is vital for their continued operation, however there are established mitigation measures which will be implemented during the construction of AyM such as marine co-ordination including the issuing of NtMs (as per Table 11). The receptor is considered to be of low vulnerability and high recoverability and value, therefore the sensitivity is considered to be **low**.

85 Overall, it is predicted that the sensitivity of the receptor is **low** and the magnitude of the impact is **negligible adverse**. Therefore, the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

Physical overlap of infrastructure

86 As identified in paragraph 1 *et seq.*, Section 12.7, there will be no physical overlap of other offshore wind farms with the AyM array, however the AyM ECC will need to cross the two existing export cables for GyM and North Hoyle, and the AyM interlink cable will extend into GyM array and cross one of the GyM inter-array cables.

87 The construction of AyM represents a risk to existing non-OWF cables through the deployment of JUVs, anchor placement, cable pre-sweeping and cable installation itself.

88 The pre-construction survey will include a geophysical and magnetometer survey that will be able to identify existing assets which includes out of service cables which may be in a different position to their charted location. Micrositing will be carried out as required in order to avoid and maintain a safe distance from existing cables.

89 Crossing agreements will allow a cable operator to access their infrastructure during the construction of AyM as far as practicable, though 500 m construction safety zones will be required (as identified in Table 10). The crossing agreements (as identified in Table 11) will ensure close communication and planning between both parties to ensure disruption of activities is minimised, and that risks are reduced to acceptable levels. A number of potential methodologies for cable crossings are under consideration, including rock armour, concrete mattress, steel bridging/ducting, CPS ducting, concrete bridging or rock bags. The final crossing design will be determined post-consent, in agreement with the relevant asset owners. Embedded mitigation also includes established co-ordination between AyM and the relevant cable-asset owners, such as at a developer level with GyM which is also operated by RWE.

90 The impact is predicted to be of local spatial extent, short-term duration, intermittent and avoidable through cable crossing agreements being in place with the relevant operators. The magnitude is therefore considered to be **negligible adverse**.

91 Disturbance to existing OWF cables has the potential to damage, reduce efficiency, de-bury or even cause failure of the assets. The operators of active OWF cables are deemed to be of medium vulnerability, medium recoverability, and high value. The sensitivity of the receptor is therefore deemed to be **high**.

92 Overall, it is predicted that the sensitivity of the receptor is **high** and the magnitude of the impact is **negligible adverse**. Therefore, the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

12.10.2 Potential impacts on non-OWF cables and pipelines.

93 The construction activities and vessel movements during the construction of AyM have the potential to affect the non-OWF cables and pipelines. The construction activities of AyM have the potential to have an impact on non-OWF cables and pipelines in the area through:

- Physical overlap of infrastructure.

Physical overlap of infrastructure

94 As identified in paragraph 52 *et seq.*, Section 12.7, there will be no physical overlap from AyM with the array of any cables or pipelines and the AyM array has sought to stand 500 m off the Eirgrid East-West Interconnector shown in Figure 4, however the AyM ECC does cross the interconnector.

95 The construction of AyM represents a risk to existing non-OWF cables through anchor placement, cable pre-sweeping and cable installation itself.

96 The pre-construction survey will include a geophysical and magnetometer survey that will be able to identify existing assets which includes out of service cables which may be in a different position to their charted location. Micrositing will be carried out as required in order to avoid and maintain a safe distance from existing cables.

97 Crossing agreements will allow a cable operator to access their infrastructure during the construction of AyM as far as practicable, though 500 m construction safety zones will be required (as identified in Table 10). The crossing agreements (as identified in Table 11) will ensure close communication and planning between both parties to ensure disruption of activities is minimised, and that risks are reduced to acceptable levels. A number of potential methodologies for cable crossings are under consideration, including rock armour, concrete mattress, steel bridging/ducting, CPS ducting, concrete bridging or rock bags. The final crossing design will be determined post-consent, in agreement with the relevant asset owners.

98 The impact is predicted to be of local spatial extent, short-term duration, intermittent and reversible. The magnitude is therefore considered to be **negligible adverse**.

99 Disturbance to existing non-OWF cables is has the potential to damage, reduce efficiency, de-bury or even cause failure of the assets. The operators of active non-OWF cables are deemed to be of medium vulnerability, medium recoverability, and high value. The sensitivity of non-OWF cables is therefore deemed to be **high**.

100 Overall, it is predicted that the sensitivity of the receptor is **high** and the magnitude of the impact is **negligible adverse**. Therefore, the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

12.10.3 Potential impact on recreational fishing (including charter angling).

101 There is the potential for impacts on the recreational and charter angling community as a result of the construction activities at AyM. The construction activities of AyM have the potential to have an impact on recreational and charter angling in the area through:

- Impacts to recreational and charter angling target species; and
- Reduction in access and displacement from construction vessels and construction safety zones.

Impacts to recreational target species

102 As identified in Section 12.7, the main species of importance identified were bass, tope, black bream, rays, mackerel and pollack. Impacts to recreationally important species may occur during the construction of AyM.

103 A detailed assessment of the following potential construction impacts has been undertaken in Volume 2, Chapter 6:

- Mortality, injury, behavioural impacts and auditory masking arising from noise and vibration;
- Temporary increase in SSC and sediment deposition;
- Direct and indirect seabed disturbances leading to the release of sediment contaminants; and
- Direct damage (e.g. crushing) and disturbance to mobile demersal and pelagic fish and shellfish arising from construction activities.

104 With respect to the magnitude of this impact on recreational and charter angling, the overall significance of the effect on fish and shellfish species is used to inform the assessment. This is because the overall effect on the fish and shellfish species relates directly to the availability and number of resources available. For instance, where an effect of negligible significance is assessed for a species; a negligible magnitude is assessed for recreational angling; where an effect of minor adverse significance is assessed for a species, a minor magnitude is assessed for recreational angling etc.

105 A full assessment (including evidence and modelling) of the impacts on fish and shellfish ecology are provided in Volume 2, Chapter 6 and are summarised in Table 12, justifications are not duplicated in this chapter.

Table 12: Significance of effects on construction impacts on fish and shellfish ecology (Volume 2, Chapter 6).

POTENTIAL IMPACT	MAGNITUDE	SENSITIVITY	SIGNIFICANCE OF EFFECT
Mortality, injury, behavioural impacts and	Low	Medium	Minor adverse

POTENTIAL IMPACT	MAGNITUDE	SENSITIVITY	SIGNIFICANCE OF EFFECT
auditory masking arising from noise and vibration			
Temporary increase in SSC and sediment deposition	Low	Medium	Minor adverse
Direct and indirect seabed disturbances leading to the release of sediment contaminants	Low	Medium	Minor adverse
Direct damage (e.g. crushing) and disturbance to mobile demersal and pelagic fish and shellfish arising from construction activities	Low	Medium	Minor adverse

106 The impacts are predicted to be of regional spatial extent and of short-term duration. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low adverse** for all potential impacts.

107 There is potential for angling grounds beyond the immediate footprint of the construction activities to be affected by these impacts. Exposure to the impact is likely and important target species will be affected. Disturbed fish species will return immediately following the construction phase so recoverability will be high.

108 Due to the range of alternative areas and distribution of target species throughout the Irish Sea, recreational anglers are considered to be of low vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **low**.

109 Overall, it is predicted that the sensitivity of the receptor is **low** and the magnitude is **low adverse** and therefore the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

Reduction in access and displacement from construction vessels and construction safety zones

110 The use of construction phase safety zones (500 m) during construction has the potential to reduce and restrict access to recreational and charter angling within the draft order limits, however the areas subject to active construction works (and therefore increased vessel movements) at any one time will be small and therefore any attendant restriction on activities will be similarly limited in extent.

111 The impact is considered to be short to medium term (throughout the 36 months construction period), of local extent, intermittent and reversible and therefore the magnitude of impact is considered to be **low adverse**.

112 Recreational and charter angling will potentially be sensitive to exclusion from favoured fishing spots within the draft order limits, however these areas are subject to active construction works (and therefore safety zones) at any one time will be small and there are a wide range of alternative locations and areas that will remain unaffected during construction, both inside, and out with the draft order limits. A detailed Navigational Risk Assessment (NRA) has been undertaken and is discussed in Volume 2, Chapter 10, it should be noted that it isn't considered that there will be an increase in steaming time as a consequence of displacement.

113 Access to fishing marks may be lost due to construction zones, but this is temporary. Fishing marks will not be lost as these are wrecks and reefs which will be avoided during construction (as identified in Table 11).

114 As a result of the provisions of advanced warning of the specific construction locations during the construction phase, recreational anglers will be kept fully informed as to the location and duration of any potential restricted areas during the construction of AyM; details on the timings and schedules of works will be promulgated (as identified in Table 11) ahead of works in order to allow for recreational fishermen to avoid these construction areas and safe passing distances. Therefore, these provisions, alongside the flexibility to fish in alternative and available locations, reduces the potential for these receptors to be sensitive to the potential impacts arising.

115 It is therefore considered that the sensitivity of recreational fishing (including charter angling) is **low**.

116 Overall, it is predicted that the sensitivity of the receptor is **low** and the magnitude is **low adverse** and therefore the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

12.11 Environmental assessment: operational phase

117 This section addresses the site operation and maintenance phase impacts, through reference to the MDS presented in Table 10.

12.11.1 Potential impacts on cables

118 The O&M activities and vessel movements during the O&M phase of AyM have the potential to affect cables. The construction O&M phase of AyM has the potential to have an impact on cables in the area through:

- Increased vessel traffic.

Increased vessel traffic

119 The O&M activities at AyM have the potential to impact on the O&M activities (such as repair work) of other cables in the area through increased vessel traffic. The operation of AyM will have minimal effects in terms of disruption to passing traffic (see Volume 2, Chapter 9), however the maintenance vessels for other cables could pass close to, or through the AyM draft order limits.

120 The number of vessel movements during O&M will be less than the maximum number used during construction, and therefore the magnitude of the effect is considered to be the same as considered for construction activities.

121 The O&M for other OWF and cable assets in the area is vital for their continued operation, however there are established mitigation measures which will be implemented during the construction of AyM such as the issuing of NtMs (as per Table 11), this will ensure that disruption to O&M activities is minimal and vessels are managed such that they will not interact. The effect is considered to be short to medium-term (throughout the O&M phase) of local extent, intermittent and reversible. The magnitude of the effect is therefore considered to be **negligible adverse**.

122 It should also be noted that increased vessel numbers will not result in disturbance to O&M activities as there will be no restriction to the cable assets. The receptor is considered to be of low vulnerability and high recoverability and value, therefore the sensitivity is considered to be **low**.

123 Overall, it is predicted that the sensitivity of the receptor is **low** and the magnitude of the impact is **negligible adverse**. Therefore, the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

12.11.2 Potential impact on recreational fishing (including charter angling).

124 The O&M phase of AyM has the potential to affect recreational angling through:

- Physical presence of AyM array infrastructure leading to reduction in access to, or exclusion from established fishing marks; and
- Maintenance activities leading to displacement or disruption on recreational target species.

Physical presence of AyM array infrastructure leading to reduction in access to, or exclusion from established fishing marks

125 The presence of WTGs within the array has the potential to displace or exclude anglers (both recreational and charter) from existing fishing marks. Wrecks (including those targeted by anglers) will be subject to archaeological exclusion areas (AEZs) and therefore will not be affected by the presence of WTGs (as identified in Table 11), a detailed assessment on archaeology is presented in Volume 2, Chapter 11. As such, anglers will be able to target wreck sites (with due regard to any operational safety zones identified in Table 10).

126 Recreational angling may be subject to a degree of obstruction within the area of infrastructure due to the need to maintain a safe distance, however such restrictions will be localised to within 50 m of the surface infrastructure and therefore of **negligible adverse** magnitude.

127 Disturbance to recreational angling has the potential to disturb, displace and/or exclude anglers (recreational and charter) from the area. Access to fishing marks within AyM will be maintained (with the exception of 50 m safety zones around installed infrastructure) and therefore angling will still be possible. As presented in paragraphs 105 to 107, the receptor is therefore deemed to be of medium vulnerability, medium recoverability, and high value. The sensitivity of the receptor is therefore deemed to be **low**.

128 Overall, it is predicted that the sensitivity of the receptor is considered to be **low** and the magnitude is considered to be **negligible adverse**. The effect will therefore be of ***minor adverse*** significance, which is not significant in EIA terms.

Maintenance activities leading to displacement or disruption on recreational target species

129 A detailed assessment of the following potential O&M impacts has been undertaken in Volume 2, Chapter 6:

- Long-term loss of habitat due to the presence of turbine foundations, scour protection and cable protection;

- Increased hard substrate and structural complexity as a result of the introduction of turbine foundations, scour protection and cable protection; and
- Electromagnetic Field (EMF) effects arising from cables during O&M phase.

130 The approach to this assessment follows that outlined for construction, with details of the fish and shellfish assessment summarised in Table 13.

Table 13: Significance of effects of O&M impacts on fish and shellfish ecology (Volume 2, Chapter 6).

POTENTIAL IMPACT	MAGNITUDE	SENSITVITY	SIGNIFICANCE OF EFFECT
Long-term loss of habitat due to the presence of turbine foundations, scour protection and cable protection	Low	Medium	Minor adverse
Increased hard substrate and structural complexity as a result of the introduction of turbine foundations, scour protection and cable protection	Low	Medium	Minor adverse
EMF effects arising from cables during operational phase	Low	Low	Minor adverse

131 The impact is predicted to be of regional spatial extent and of short-term duration. It is predicted that the impact will affect the receptor directly through loss of resources. The magnitude if therefore considered to be **low adverse** for all potential impacts.

132 Commercial catches having increased significantly and combined with long term studies indicate that the overall size and weight of commercial and recreational target species has not materially altered within the region over 16 years (Volume 4, Annex 12.1: Recreational Fishing Baseline). This is also demonstrated through the EMF studies at GyM which indicate no material change in the presence of electro sensitive fish species that are targeted. The results of the GyM study, together with others such as the Burbo Bank investigations, strongly suggest that EMF emissions associated with offshore wind farm intra-array and export cabling are not sufficient to represent a significant barrier to the movement of elasmobranchs. The study has clearly demonstrated high numbers of elasmobranchs (relative to baseline and reference areas) within an area bounded by operational submarine power cabling.

133 There is evidence across the Irish Sea of a change in tope abundance since the 70s therefore the evidence indicates a longer-term decline with limited or no evidence of a causal link between the presence of OWFs and decline tope (National Museums Northern Ireland Habitats website, 2021).

134 Due to the range of alternative areas and distribution of target species throughout the Irish Sea, combined with the predicted negligible effect on target species, recreational anglers are considered to be low vulnerability, high recoverability and medium-low value. The sensitivity of the receptor is therefore considered to be **low.**

135 Overall, it is predicted that the sensitivity of the receptor is **low** and the magnitude is **low adverse** and therefore the effect will be of ***minor adverse*** significance, which is not significant in EIA terms.

12.12 Environmental assessment: decommissioning phase

136 This section addresses the decommissioning phase impacts, through reference to the MDS presented in Table 10.

137 Impacts from decommissioning are expected to be similar to those listed for construction, if project infrastructure is removed from the seabed at the end of the development's operational life. The nature and scale of effects arising from decommissioning are expected to be of similar or reduced magnitude to those generated during the construction phase. Certain activities that were undertaken during construction are not required during decommissioning, such as piling (although underwater noise will still be produced during decommissioning).

138 If, closer to the time of decommissioning, it is deemed removal of certain aspects of the development (for example, cables) would have a greater environmental impact than leaving *in situ*, it may be preferable to leave those aspects *in situ*. In this case, the impacts would be similar to those described for the O&M phase. If certain parts of the development were left *in situ*, effects dependant on the O&M of the projects, such as maintenance activities, would not occur.

139 To date, no large OWF has been decommissioned in UK waters, it is anticipated that any future programme of decommissioning is developed in close consultation with the relevant statutory marine and nature conservation bodies. This would enable the guidance and best practice at the time to be applied to minimise any potential impacts.

12.13 Environmental assessment: cumulative effects

140 Cumulative effects refer to effects on receptors arising from AyM when considered alongside other proposed developments and activities and other reasonably foreseeable project proposals. In this context the term project is considered to refer to any project with comparable effects and is therefore not limited to OWFs.

141 The approach to the Cumulative Effects Assessment (CEA) methodology, definitions of the tier structure and complete long list are described in Volume 1, Annex 3.1: Cumulative Effects Assessment.

142 All projects and plans considered alongside AyM have been allocated into 'tiers' reflecting their current stage within the planning and development process. This allows the cumulative impact assessment to present several future development scenarios, each with a differing potential for being ultimately built out. This approach also allows appropriate weight to be given to each scenario (tier) when considering the potential cumulative impact. The proposed tier structure is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the AyM PEIR. An explanation of each tier is included in Table 14.

Table 14: Description of tiers of other developments considered for the CEA (adapted from PINS Advice Note 17).

TIER	PROJECT STAGE
Tier 1	Project under construction.
	Permitted applications, whether under the Planning Act 2008 or other regimes, but not yet implemented.
	Submitted applications, whether under the Planning Act 2008 or other regimes, but not yet determined.
Tier 2	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted as well as projects that have applied for a Marine Licence from Natural Resources Wales (NRW).
Tier 3	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted.
	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

143 The specific projects that have been scoped into this CEA and the tiers into which they fall are presented below in Table 15 below.

12.13.1 Identification of relevant plans and projects

144 The longlist has been reduced to a shortlist for assessment in this chapter based on a consideration of:

- Stage 1: Identification of whether a spatial overlap between the plans and projects and the AyM ZoI which could potentially result in significant effects;
- Stage 2: This list was then further refined to whether there may be a temporal overlap between the potential effects of the projects. A potential temporal overlap is defined as:
  - Proposed but not yet constructed (either pre- or post-consent);
  - Only partially constructed at the time that baseline characterisation was undertaken;
  - Recently completed, during the development of the baseline characterisation, and the full extent of the impacts arising from the development(s) may not be reflected in the baseline; and/ or
  - May have consent or licences to undertake further work, such as maintenance dredging or notable maintenance works which may arise in additional effects.
- Stage 3: Defining the degree of certainty and data confidence was then considered to identify an appropriate tier for each of the projects.

145 The projects identified for the CEA on OMU receptors are presented in Table 15.

Table 15: Projects considered within the OMU cumulative effect assessment.

DEVELOPMENT TYPE	PROJECT	STATUS	DATA CONFIDENCE ASSESSMENT/ PHASE	TIER
Offshore Wind Farm	EnBW and BP 1 and 2 – Round 4	Concept/ early planning	Low – Limited data available in the public domain	Tier 3
Offshore Wind Farm	Cobra & Flotation Energy – Round 4	Concept/ early planning	Low – Limited data available in the public domain	Tier 3
Tidal Energy	North Wales Tidal Energy Project between Prestatyn and Llandudno.	In development	Medium - Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 3 – no application has been submitted
Seismic surveys	Unknown	Unknown	Low – Limited data available in the public domain.	Tier 3 – no application has been submitted

146 The cumulative MDS is described in Table 16, including the impact and scenario. Potential effects are identical to those assessed for the project alone, where the assessment for the project alone concluded negligible significance, that impact can be screened out for the cumulative assessment.

Table 16: Cumulative MDS.

POTENTIAL EFFECT	SCENARIO	JUSTIFICATION
Potential impact on recreational fishing (including charter angling).	Tier 1: No Tier 1 projects identified. Tier 2: No Tier 2 projects identified. Tier 3: ▲ The construction of the North Wales Tidal Energy project; ▲ The construction of the EnBW and BP 1 and 2 projects; ▲ The construction of the Cobra & Flotation Energy project; and ▲ Any seismic surveys will be included as and when more information is known.	If the North Wales Tidal Energy project, EnBW and BP projects and Cobra and Floatation Energy project are advanced then construction noise from those projects may result in cumulative noise with AyM construction.

147 AyM recognises that Tier 3 projects could have a potential overlap with impacts on recreational fishing (including charter angling) from AyM. However, at this stage, given the lack of information it is not possible to quantify the level of impact further. If, and when, more detailed information becomes available, the impact on recreational fishing (including charter angling) will be duly considered.

12.14 Inter-relationships

148 The inter-related effects assessment considers any likely significant effects from multiple impacts and activities from the construction, operation and decommissioning of AyM on the same receptor, or group of receptors. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, O&M and decommissioning); to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages (e.g. subsea noise effects from piling, operational WTGs, vessels and decommissioning); and
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on benthic ecology such as direct habitat loss or disturbance, sediment plumes, scour, JUV use etc., may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short-term, temporary or transient effects, or incorporate longer term effects.

149 A description of the likely inter-related effects arising from AyM on OMU is provided in Volume 2, Chapter 15: Inter-related effects and covers the assessment of all inter-relationship effects. This includes the inter-relationships of OMU receptors with:

- Fish and Shellfish Ecology – impacts on target species may impact on recreational fishing (including charter anglers);
- Shipping and navigation – impacts relating to vessel transits may impact on OMUs (such as aggregate extraction) and
- Aviation and Radar – impacts on aviation and radar may impact military areas.

12.15 Transboundary effects

150 Due to the localised nature of any potential impacts and mitigations options available, transboundary impacts are unlikely to occur on infrastructure and other users and therefore have been scoped out from further consideration within the EIA as agreed with PINS.

12.16 Summary of effects

151 This chapter has assessed the potential effects on OMU receptors arising from AyM. The range of potential impacts and associated effects considered has been informed by scoping responses as well as reference to existing policy and guidance. Potential impacts considered in this chapter, alongside any mitigation and residual effects are summarised below in Table 17.

152 Throughout the construction, operation and decommissioning phases, all impacts assessed were found to have either negligible, or minor effects on OMU receptors within the study area and are therefore not significant in regard of the EIA Regulations.

153 The assessment of cumulative impacts from AyM and other developments and activities, including offshore wind farms, concluded that the effects of any cumulative impacts would be of minor significance, and not significant in regard of the EIA Regulations.

Table 17: Summary of effects.

IMPACT	MAGNITUDE	SENSITIVITY OF RECEPTOR	MITIGATION MEASURES	RESIDUAL EFFECT
CONSTRUCTION				
Impacts on other offshore wind farms	Negligible adverse	Low - High	None beyond the embedded measures proposed	Minor adverse (not significant)
Potential impacts on non-OWF cables and pipelines.	Negligible adverse	High	None beyond the embedded measures proposed	Minor adverse (not significant)
Potential impact on recreational	Low adverse	Low	N/A	Minor adverse (not significant)
OPERATION				
Potential impacts on cables	Negligible adverse	Low	None beyond the embedded measures proposed	Minor adverse (not significant)

IMPACT	MAGNITUDE	SENSITIVITY OF RECEPTOR	MITIGATION MEASURES	RESIDUAL EFFECT
Potential impact on recreational	Negligible adverse	Low	N/A	Minor adverse (not significant)
DECOMMISSIONING				
Impacts from decommissioning are expected to be similar to those listed for construction, if the project's infrastructure is removed from the seabed at the end of the development's operational life. If, closer to the time of decommissioning, it is deemed removal of certain aspects of the development (for example cables) would have a greater environmental impact than leaving *in situ*, it may be preferable to leave those aspects *in situ*. In this case, the impacts for decommissioning would be similar to those described for the O&M, except where effects are dependent on the maintenance of the project.				
CUMULATIVE EFFECTS				
Potential impact on recreational	Low adverse	Medium	N/A	Minor adverse (not significant)

12.17 References

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