From: [redacted]
To: [redacted]
Subject: 202208802-Ref-ORML2233 Awel y Mor Marine Licence Application Consultation
Date: 02 August 2022 11:50:30
Attachments: ORML2233 - 6.2.1_AyM_ES_Volume2_Chapter1_OffshorePD_vFinal.pdf
ORML2233 - ML-1.4.1_AyM_GuidetotheML-Application (2).pdf
ORML2233 - ML-2.13_AyM_Marine Licence Plan Areas Map.pdf
ORML2233 marine works application form final update-160622.pdf
ORML2233 - ML-1.1_AyM - Marine Licence Application cover letter.pdf
ORML2233 - 6.7.1_AyM_Non-technical_Summary_English_vFinal.pdf
ORML2233 Consultation Letter General.pdf

Good morning Peter,

DIO Ref-10055795
Application reference number-ORML2233

Thank you for consulting the Ministry of Defence (MOD) on Part 4 -Marine Licence for Awel y Môr offshore wind farm. The Marine Licence application is required to construct and operate the proposed Awel y Môr Offshore Wind Farm located 10.5km off the north east coast of Wales. The Windfarm comprises of up to 50 wind turbine generators and associated infrastructure.

After reviewing the documents provided above, I can confirm that the MOD has no safeguarding objections to the Marine Licence for the locations specified , licence start date October 2023 - expiry date December 2025.

Kind Regards

Kalie Jagpal | Assistant Safeguarding Manager| Safeguarding |
St George's House| Defence Infrastructure Organisation Head Office |
DMS Whittington | Lichfield | Staffordshire | WS14 9PY

[redacted]

Due to COVID-19 I am working from home until further notice.
In line with the latest guidance, I am working offline where possible to ease the pressure on the IT network. Therefore I will only check emails and Skype periodically which will mean that I might not respond as promptly as usual.

Website: www.gov.uk/dio/
Twitter: @mod_dio
Read DIO's blog http://insidedio.blog.gov.uk/

From: Morrison, Peter [redacted]
Sent: 22 June 2022 12:15
To: Morrison, Peter [redacted]
Subject: ORML2233 Awel y Mor Marine Licence Application Consultation

Dear Consultee,

Please find attached an application for a Marine Licence and covering letter for:

Awel y Môr Offshore Wind Farm

The Marine Licensing Team has received an application from Awel y Môr Offshore Wind Farm Limited, for a Marine Licence under Part 4 of the Marine and Coastal Access Act 2009, to undertake the above stated works.

I have attached;
Consultation request letter
marine licence application form,
Marine Licence application form cover letter
AyM Document List (1.4.1 AyM Guide to the ML application)
Marine Licence Plan Areas Map,
Environmental Statement Volume 2 Chapter 1 Offshore Project Design
non-technical summary of the Environmental Statement.

A copy of all application documents can be accessed on our fileshare system. The documents are also available on our online public register [redacted]. You can search for the documents using the application reference number **ORML2233**. If you have trouble accessing the documents please let me know, and if additional colleague require access to the file share system please could you share their email address with me.

Please submit any comments within **42 days**, this date being **3 August 2022**, referencing the case number **ORML2233.**

If you do not respond by the date above, I will assume you have no comment to make.

Please assess the application on a year timescale, to highlight any potential seasonal effects/hazards.

Please be aware that in addition to the marine licence application, Awel y Môr Offshore Wind Farm Limited has submitted an application for a Development Consent Order which is currently being considered by Planning Inspectorate. Further information on the application for a Development Consent Order can be found on the Planning Inspectorate's website.

The marine licence application determination will be running in parallel to that of the DCO. Although there are areas of overlap both have a separate and distinct processes.
We would direct you to the Marine Licence Application form and the Offshore Project Description chapter of the Environmental Statement which highlights what works are within the marine licensable area.

If you have any queries regarding this application, please do not hesitate to contact myself.

Kind regards,

Pete

Peter Morrison

Swyddog Arbenigol Arweiniol (Trwyddedu Morol) / Lead Specialist Officer (Marine Licensing)
Cyfoeth Naturiol Cymru / Natural Resources Wales
Ty Cambria, Caerdydd / Cambria House, Cardiff

Siaradwr Cymraeg

Yn falch o arwain y ffordd at ddyfodol gwell i Gymru trwy reoli'r amgylchedd ac adnoddau naturiol yn gynaliadwy.

Proud to be leading the way to a better future for Wales by managing the environment and natural resources sustainably.

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Twitter | Facebook | LinkedIn | Instagram

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi. Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

Awel y Môr Offshore Wind Farm

Category 6: Environmental Statement

Volume 2, Chapter 1: Offshore Project Description

Date: April 2022

Revision: B

Application Reference: 6.2.1

Pursuant to: APFP Regulation 5(2)(a)

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B	March 2022	ES	GoBe Consultants	RWE	RWE

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Glossary of terms

TERM	DEFINITION
The array	The area where the wind turbines will be located.
AyM	The Awel y Môr Offshore Wind Farm project.
Export Cable Corridor (ECC)	The area(s) where the export cables will be located.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) .

TERM	DEFINITION
Design envelope/ Maximum Design Scenario (MDS)	The maximum design parameters of the combined project assets that result in the greatest potential for change in relation to the impacts assessed.
LiDAR	Light Detection and Ranging (remote sensing).
Marine Licence	A licence under the Marine and Coastal Access Act 2009 for marine works in Welsh waters which is administered by the Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
PEIR	Preliminary Environmental Information Report. The PEIR was written in the style of a draft Environmental Statement (ES) and formed the basis of statutory consultation. Following that consultation, the PEIR documentation was updated into the final ES that accompanies the applications for the Development Consent Order (DCO) and Marine Licence.
Order Limits	The extent of development including all offshore and onshore works areas.

Abbreviations and acronyms

TERM	DEFINITION
AIS	Automatic Identification System
AyM	Awel y Môr Offshore Wind Farm
AyMOWFL	Awel y Môr Offshore Wind Farm Limited (the Applicant)
BEIS	Department for Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority

TERM	DEFINITION
CBRA	Cable Burial Risk Assessment
CfD	Contract for Difference
CFE	Controlled Flow Excavation
CTV	Crew Transfer Vessel
DCO	Development Consent Order
DECC	Department for Energy and Climate Change (now BEIS)
DP	Dynamic Positioning
EIA	Environmental Impact Assessment
ES	Environmental Statement
GBS	Gravity Based Structure
GyM	Gwynt y Môr Offshore Wind Farm
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drill
HVAC	High Voltage Alternative Current
HVDC	High Voltage Direct Current
ID	Identification
JUV	Jack-Up Vessel
LAT	Lowest Astronomical Tide
MAP	Main Access Platform
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MDS	Maximum Design Scenario

TERM	DEFINITION
MFE	Mass Flow Excavation
MHWS	Mean High Water Springs
NPS	National Policy Statement
NRW	Natural Resources Wales
O&M	Operation and Maintenance
OSP	Offshore Substation Platform
OWFIZ	Other Wind Farm Infrastructure Zone
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
PVM	Permanent Vessel Mooring
RD	Rotor Diameter
ROV	Remotely Operated Vehicle
SCADA	Supervisory Control and Data Acquisition
SLVIA	Seascape, Landscape and Visual Impact Assessment
SoS	Secretary of State
SOV	Service Operation Vessel
THLS	Trinity House Lighthouse Service
TJB	Transition Joint Bay
TP	Transition Piece
TSHD	Trailing Suction Hopper Dredger
UXO	Unexploded Ordnance

TERM	DEFINITION
WTG	Wind Turbine Generator

Units

UNIT	DEFINITION
cd	Candela
dB	Decibel
hr	Hour
km	Kilometre
kJ	Kilojoule
kV	Kilovolt
m	Metre
m^2	Square metre
m^3	Cubic metre
mm	Millimetre
MW	Megawatt
nm	Nautical mile
s	second

1 Offshore project description

1.1 Introduction

1 This chapter of the Environmental Statement (ES) describes the offshore elements of the proposed Awel y Môr Offshore Wind Farm (hereafter referred to as 'AyM'). It sets out the AyM design and components for the offshore infrastructure, as well as the main activities associated with the construction, Operation and Maintenance (O&M) and decommissioning of the offshore elements of AyM.

2 This chapter has been drafted by GoBe Consultants on behalf of Awel y Môr Offshore Wind Farm Limited (AyMOWFL) ('the Applicant'), and sets out:

- The design envelope approach;
- Consultation relating to the offshore project design undertaken to date;
- An overview of the project location and proposed offshore site boundaries;
- The design envelope of the offshore project components and the techniques used to build, operate, maintain and decommission AyM; and
- The indicative project programme.

3 This chapter details the above insofar as related to the offshore components of the proposed scheme up to and including the landfall where the offshore export cables will meet the onshore export cables. Full details of the onshore elements of the proposed development are provided in Volume 3, Chapter 1: Onshore Project Description (application ref: 6.2.1).

4 A detailed description of the site selection process that has resulted in the selection of the locations of project infrastructure and routes taken is also provided in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives (application ref: 6.1.4).

1.2 Design envelope approach

1.2.1 Overview

5 At this stage in the AyM development process, decisions on exact locations of infrastructure and the precise technologies and construction methods employed cannot be made. Therefore, the project description at this stage sets out the main components and parameters of the project and the design envelope approach (often referred to as the 'Rochdale Envelope') has been used to provide certainty that the final project as built will not exceed these parameters, whilst providing the necessary flexibility to accommodate further project refinement during the detailed design phase post-consent.

6 This flexibility is required in terms of options for foundation types, Wind Turbine Generator (WTG) model and size, siting of infrastructure and construction methods to ensure that anticipated changes in available technologies between now and the detailed design phase can be accommodated within the DCO, whilst retaining an Environmental Impact Assessment (EIA) that considers all options, with conclusions that are robust regardless of the final design eventually built out.

7 The final project design will depend on factors including ground and environmental conditions that will be subject to detailed pre-construction surveys, project economics and the approach to procurement of resources. This chapter therefore sets out a series of options, all of which are encompassed within the overall design envelope and have been assessed.

1.2.2 Policy and legislative context

8 The design envelope approach is recognised in the Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a), the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b) and the NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c). This approach has been used in the majority of offshore wind applications. The approach is also recognised in the draft NPSs which were consulted on between September and November 2021. At the time of writing being, the draft NPSs are not adopted policies, however they are considered alongside the extant NPSs in Table 1 below.

Table 1: Provisions of the NPS and draft NPS regarding the design envelope approach.

LEGISLATION/ POLICY	KEY PROVISIONS
NPS EN-3 Paragraph 2.6.42	'Owing to the complex nature of offshore wind farm development, many details of a proposed scheme may be unknown to the applicant at the time of application, possibly including: • Precise location and configuration of turbines and associated development; • Foundation type; • Exact turbine tip height; • Cable type and cable route; • Exact locations of offshore and/ or onshore substations.'
Draft NPS EN-3 Paragraph 2.23.6	'Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application to the Secretary of State, possibly including: • The precise location and configuration of turbines and associated development; • The foundation type and size; • The installation technique or hammer energy; • The exact turbine tip height and rotor swept area; • The cable type and precise cable route; • The exact locations of offshore and/or onshore substations.'

LEGISLATION/ POLICY	KEY PROVISIONS
NPS EN-3 Paragraph 2.6.42	'The Secretary of State should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have to ensure that the project as it may be constructed has been properly assessed (the Rochdale [Design] Envelope)'.
Draft NPS EN-3 Paragraph 2.23.7	'The Secretary of State should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have to ensure that the project as it may be constructed has been properly assessed (the Rochdale [Design] Envelope)'.
NPS EN-3 Paragraph 2.6.42	'The 'Rochdale [Design] Envelope' is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES [Environmental Statement] inadequate'.

LEGISLATION/ POLICY	KEY PROVISIONS
Draft NPS EN-3 Paragraph 2.23.7	'The 'Rochdale [Design] Envelope' is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES [Environmental Statement] inadequate'.

9 The design envelope approach is widely recognised and is consistent with the Planning Inspectorate (PINS) Advice Note Nine: Rochdale Envelope (PINS, 2018). Page 11 of that note states that:

'The 'Rochdale Envelope' is an acknowledged way of dealing with an application comprising EIA development where details of a project have not been resolved at the time when the application is submitted'.

10 Throughout the EIA, the design envelope approach has been taken to allow meaningful assessments of AyM to proceed, whilst still allowing reasonable flexibility for future project design decisions.

1.2.3 Relationship to the maximum design scenario

11 This chapter sets out the full offshore design envelope for AyM, however in4dividual impact assessments do not consider all options. Instead, for each impact, the assessment is based upon the scenario which results in the greatest potential for change, sometimes referred to as the 'worst-case' scenario. In the context of AyM, this is referred to as the Maximum Design Scenario (MDS) approach.

12 For example, for the impact of long-term benthic habitat loss the MDS is defined by the scenario resulting in the largest physical interaction with the seabed, which would result from Gravity Based Structure (GBS) foundations. However, for underwater noise impacts on fish and marine mammals, the scenario that would result in the greatest propagation of underwater noise would be from piled foundations. Adopting this approach ensures that the 'worst-case' scenario for each impact is robustly considered, and therefore any other scenario as built would not result in impacts of greater significance of effect than those assessed in the EIA. It also reduces the volume of assessment documentation required to allow a proportionate but robust EIA.

13 To avoid excessive conservatism in the EIA, the parameters assessed throughout the EIA are not necessarily a combination of the MDS for each component, hence the MDS is chosen on an impact-receptor basis, on a range of eventual build-out scenarios. The details of the MDS for each impact assessed are described in detail within the topic-specific chapters of the ES.

1.2.4 WTG scenarios

14 As described above, the Applicant requires flexibility in WTG choice to ensure that anticipated changes in available technology and project economics can be accommodated within the project design. The design envelope therefore sets a maximum and, where relevant, a minimum realistic worst-case scenario against which environmental effects have been assessed.

15 The electrical output (capacity in megawatts (MW)) of the wind farm and that of individual turbines is not considered a material factor in determining the MDS for environmental assessments. Rather, it is the physical dimensions such as tip height, rotor diameter and seabed footprint of WTGs that have meaningful implications for EIA. It is therefore not considered necessary to constrain the design envelope to a particular capacity and, as such, this is not referred to within the ES.

16 In recent years, as turbine technology has been developed, it has become clear that there is no strong correlation between electrical output and physical dimensions. Improvements in efficiency can also be made without alterations to physical dimensions. The design envelope was developed in accordance with the application requirements of The Crown Estate (TCE) extensions round and follows the conditions of the agreement for Lease (AfL). The MDS assessment parameters have been clearly defined throughout the ES and have been secured via the draft DCO (application ref: 3.1).

17 For the purposes of defining the material factors of the MDS, it is necessary to consider likely scenarios that could eventually be built out, based on realistic eventualities, in order that the MDS values can be determined. These scenarios are based on the physical dimensions of individual WTGs at either end of the design envelope, which in turn form the MDS values of the assessments presented in the ES. The electrical output of individual WTGs is not fixed against these parameters, however the final design, including the WTG model chosen, will be limited by these parameters as assessed consistently throughout the ES and as defined in the draft DCO (application ref: 3.1). For AyM, two indicative WTG scenarios are considered:

- **Larger WTG:** The largest WTGs within the design envelope. For the purposes of assessment this is assumed to be up to 34 of the largest possible WTGs with a Rotor Diameter (RD) of up to 306 m; and
- **Smaller WTG:** The greatest number of WTGs within the design envelope. For the purposes of assessment this is assumed to be up to 50 smaller WTGs with a RD of up to 250 m.

18 When WTG parameters are discussed, this chapter presents the MDS for both these scenarios, which have been chosen to represent the realistic worst-case impacts resulting from either the greatest number of smaller WTGs, or the largest WTGs spaced further apart and therefore fewer in number.

19 In line with the design envelope approach, the eventual built-out scenario may differ from these scenarios but in any event will not be permitted to exceed the MDS assessed. Therefore, confidence can be had that resulting environmental effects will not exceed the worst-case assumptions of the EIA.

1.3 Consultation

20 Consultation is a key part of the DCO and Marine Licence application processes. Consultation regarding the project description has been conducted through the Scoping Report (innogy, 2020), subsequently via the Evidence Plan process, bi-lateral stakeholder engagement, and statutory consultation. The Evidence Plan is a framework for consultation between the Applicant, its specialist advisors, statutory bodies and regulators, and covers a variety of EIA topics.

21 During statutory consultation under Sections 42 and 47 of the Planning Act 2008 (PA2008), comments were received across various technical EIA topics that related to the project design envelope. These are described within the technical ES chapters, and the Consultation Report (application ref: 5.1). However, since those comments were received in relation to technical chapters rather than the project description chapter itself, they are not repeated here. The design changes since PEIR are summarised in Section 1.3.1 *et seq*. below, however for further detail please see the Consultation Report (application ref: 5.1) and Volume 1, Chapter 4: Site Selection and Consideration of Alternatives (application ref: 6.1.4).

22 A summary of the key issues raised during consultation specific to the offshore project description is set out below in Table 2, together with a description of how those issues have been considered and addressed in this chapter.

1.3.1 Design changes adopted in response to statutory consultation

23 As described in the Consultation Report (application ref: 5.1), as a result of statutory consultation, the offshore project design was amended post-PEIR and/ or refined in a number of ways, which can be summarised as:

- The offshore array area has been further reduced in scale;
- The maximum number of WTGs has been further reduced; and
- The landfall design has been amended to avoid above-ground permanent works within the Rhyl Golf Club (see also Volume 3, Chapter 1: Onshore Project Description (application ref: 6.3.1) for further detail.

Table 2: Summary of consultation relating to the offshore project description.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
SoS Scoping Opinion (July 2020)	Scoping Report does not provide a clear estimate of the individual or combined capacity of WTGs (MW) for the Proposed Development.	As explained in paragraph 15 *et seq.* of this document, the EIA is not linked directly to the electrical output capacity of individual WTGs or the overall capacity of AyM as it is not considered to be a material consideration in determining the MDS. Rather, it is the physical dimensions such as tip height and rotor diameter of WTGs that have meaningful implications for EIA. It is therefore not considered necessary to constrain the design envelope to a particular capacity and as such it is not referred to within the ES. Therefore, the MDS parameters assessed in the ES have been defined based on the physical parameters of the design envelope, which are consistently assessed throughout the ES and secured via the draft DCO (application ref: 3.1). In recent years, the capacity of WTGs has become more flexible and may differ depending on the conditions of the site, and
SoS Scoping Opinion (July 2020)	The Applicant should provide a clear estimate of WTG output (individual and combined) and ensure this is consistent throughout the ES and supporting documentation.	

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		improvements in efficiency can be made without alterations to physical dimensions.
SoS Scoping Opinion (July 2020)	The Applicant should justify in the ES why scour protection has been included or excluded in the estimation of maximum footprint diameter (m^2) for all foundation types being considered for the design of the Proposed Development.	The requirements for scour protection around foundations is explained within Section 1.8.2 of this document. As the MDS for scour protection includes rock placement, this is considered a material consideration for the impact on the seabed. Values within Section 1.8 of this document provide for foundation footprints both including and excluding scour protection.
SoS Scoping Opinion (July 2020)	Scoping Report states both a met mast and floating LiDAR are being considered. However, floating LiDAR is not described in Chapter 3, Table 2 and parameters have not been provided in this Scoping Report. The Applicant should provide a description, estimate of parameters and impact assessment of floating LiDAR in the ES.	Floating LiDAR is considered as an alternative option to using a met mast. A description of the design envelope for the met mast is provided in Section 1.8.8 of this document and the parameters for floating LiDAR buoys are considered to be within the MDS for the met mast.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
SoS Scoping Opinion (July 2020)	The Scoping Report refers to export circuits in Table 19 and Table 20 but this component has not been described in the Scoping Report. The Applicant should provide a clear description of export circuits and how this component relates to other elements of the Proposed Development in the ES.	The design envelope for export cables is described within Section 1.8.10 of this document and includes a description of how export cables are linked to other elements of the project design. For clarity, one offshore export cable is required per circuit, and therefore in terms of offshore cabling, the terms 'circuit' and 'cable' can be considered interchangeable. For the onshore export cables, each circuit may comprise more than one separate cable, as explained in Volume 3, Chapter 1: Onshore Project Description.
Statutory section 42 consultation 31st August 2021 – 11th October 2021	Several comments received during the statutory consultation requested a further reduction to the offshore array and the scale of individual WTGs, in particular to address concerns over significant effects on seascape, landscape and visual receptors.	The design evolution of the project is described in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives (application ref: 6.1.4). The changes to the project design adopted in response to statutory consultation are described in detail in the Consultation Report (application ref: 5.1).

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
		The key changes to the project design since the publication of the PEIR are described above in Section 1.3.1 *et seq*.

1.4 Project overview

24 AyM is a proposed 'sister project' to the existing and operational Gwynt y Môr Offshore Wind Farm (GyM). The Order Limits of AyM, in which all project infrastructure will be located, are shown in Figure 1 below. For the offshore aspects of the project, this boundary encompasses:

- **The array area:** the area where the Wind Turbine Generators (WTGs), Offshore Substation Platforms (OSPs), associated foundations, inter-array cables, inter-platform cables, export cables (including the GyM interlink cable), a meteorological mast (met mast) (or suitable alternative such as floating LiDAR) and Permanent Vessel Moorings (PVMs) may be located;
- **The 'Other Wind Farm Infrastructure' Zone (OWFIZ):** an area to the west of the array area, which will preclude WTGs and OSPs but will allow for a met mast, inter-array cables and PVMs;
- **The offshore Export Cable Corridor (ECC):** the area where the offshore export cables will be installed, bringing power generated to the onshore cable circuits at landfall between Rhyl and Prestatyn;
- **The 'GyM interlink' zone:** an area that extends from the AyM array into the GyM array to facilitate connection from one of the AyM OSPs or a WTG to the western GyM OSP; and
- **The 'subsea infrastructure and temporary works' area:** an area that extends 500 m west of the array boundary in which cables may be located, as well as where temporary works associated with the WTG array may take place (such as jack-up operations).

25 Within these offshore areas, AyM will be comprised of WTGs and all associated infrastructure required to transmit the electricity generated to shore, where it will then be transmitted by the onshore infrastructure to the National Grid network via the grid connection at Bodelwyddan, as well as all infrastructure required to operate and maintain the wind farm.

26 The key permanent offshore components of AyM are likely to include:

- Foundations;
- WTGs;
- OSPs;

- Met mast (or suitable alternative such as floating LiDAR);
- PVMs;
- Subsea inter-array cables linking individual WTGs, inter-platform cables linking OSPs, and cables linking the met mast and PVMs to one another, to the OSPs or WTGs;
- An interlink cable linking GyM to AyM;
- Subsea export cables linking OSPs to shore;
- Scour protection around foundations;
- Cable protection where sufficient cable burial is not achievable; and
- Cable crossings.

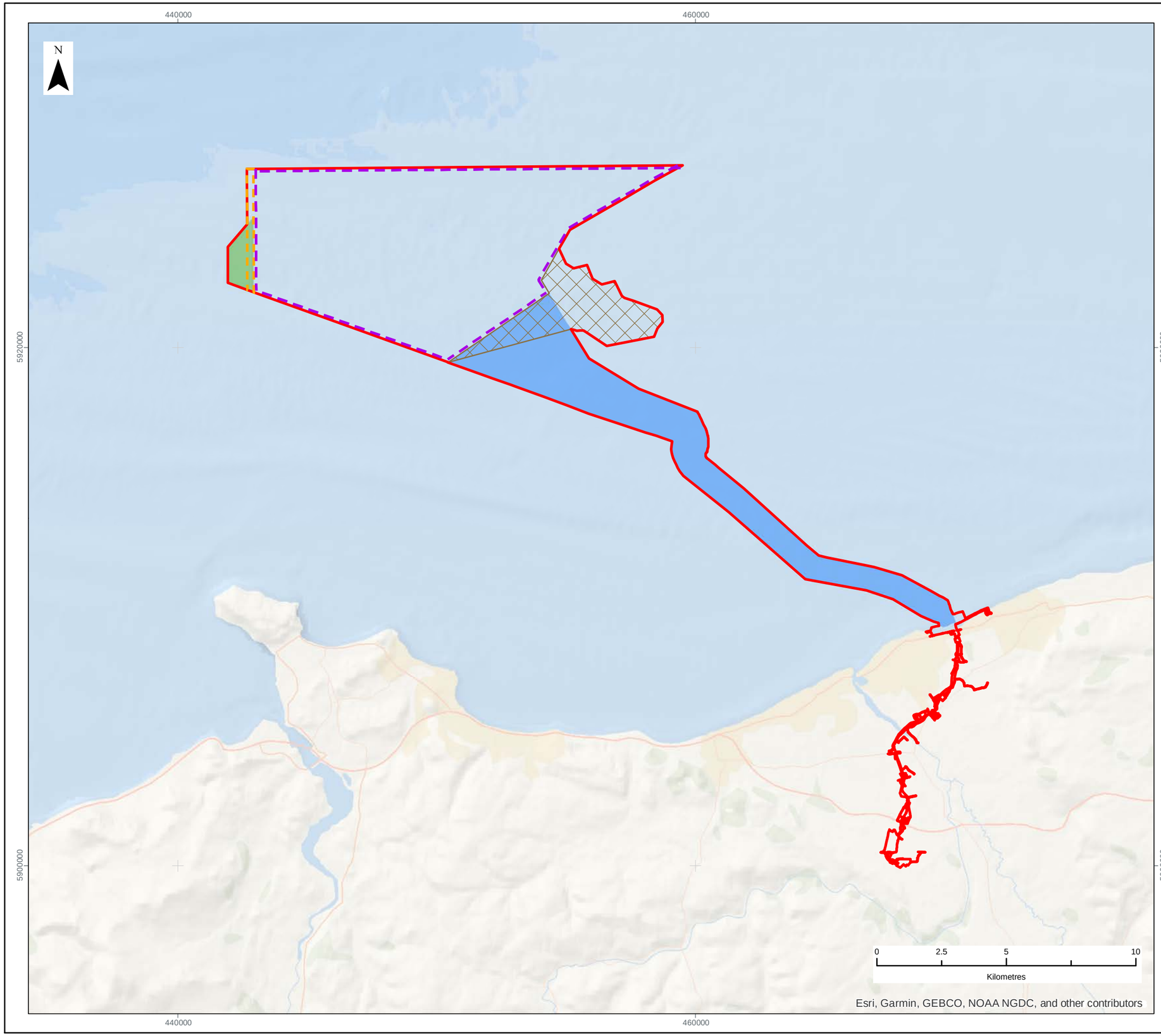
27 It is likely that the components for AyM will be fabricated at manufacturing sites across the UK, Europe and farther afield. A construction base (port facility) may be used to stockpile some components, such as foundations and WTGs, before delivery to site for installation. Other components, such as prefabricated units and cables, may be delivered directly to site when required.

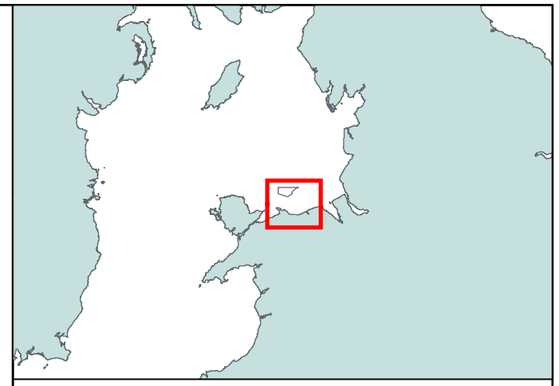
28 Table 3 below describes the general wind farm site information, with more detail on each component described in the subsequent sections.

Table 3: AyM site information.

PROJECT PARAMETER	MAXIMUM DESIGN SCENARIO
Array area (km^2)	78
Number of WTGs	50 (smaller), or 34 (larger)
Number of OSPs	2
Number of met masts	1
Number of floating LiDAR buoys	3
Number of PVMs	3

PROJECT PARAMETER	MAXIMUM DESIGN SCENARIO
Total inter-array cable length installed in the seabed (km)	116
Number of offshore export cable circuits	2
Total offshore export cable length (km)	79.4 (including 10 km for the GyM interlink cable)





LEGEND

- Order Limits
- Array Area
- Offshore Export Cable Corridor
- Other Wind Farm Infrastructure Zone
- Subsea Infrastructure and Temporary Works Area
- GyM Interlink Zone

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

The AyM Order Limits

VER	DATE	REMARKS	Drawn	Checked
1	15/09/2021	For Issue for PEIR	BPHB	RM
2	03/03/2022	For Issue For ES	BPHB	RM

FIGURE NUMBER:

Figure 1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:150,000	A3	WGS84	UTM30N

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

G:\GIS\GIS_Projects\0141 AyM\GIS\Figures\ES\Project Description\AyM_PD_ES_Fig1_The_AyM_RLB.mxd

1.5 Project programme

1.5.1 Overview

29 This ES accompanies the final applications for the DCO and Marine Licence, respectively, and the Applicant expects consent determinations from Q3 2023 onwards. Post-consent, the detailed design phase would commence with a view to beginning construction in 2026, following pre-construction surveys and works in 2024 and 2025. The Applicant's objective is for AyM to be fully operational and commissioned by 2030 in order to help meet UK and Welsh Government renewable energy targets. Further information about these energy targets is provided in Volume 1, Chapter 2: Policy and Legislation (application ref: 6.1.2).

30 The construction programme for AyM is dependent on a number of factors which may be subject to change, including:

- The timeliness and date of the works necessary to connect the project to the National Grid;
- The date that the other necessary consents, including Marine Licence(s), are granted; and
- The availability and lead-in times associated with procurement and installation of project components.

31 As stated above, offshore construction is anticipated to commence in 2026, through to final commissioning in 2030. Offshore construction works are typically carried out under relatively calm metocean conditions normally experienced during the summer, although some activities may take place throughout the year. Furthermore, 24-hour offshore working will be required, with illumination required on construction vessels during night-time and low light conditions. Figure 2 below illustrates the indicative dates and durations for each activity, and the order in which they are expected to occur in the construction campaign.

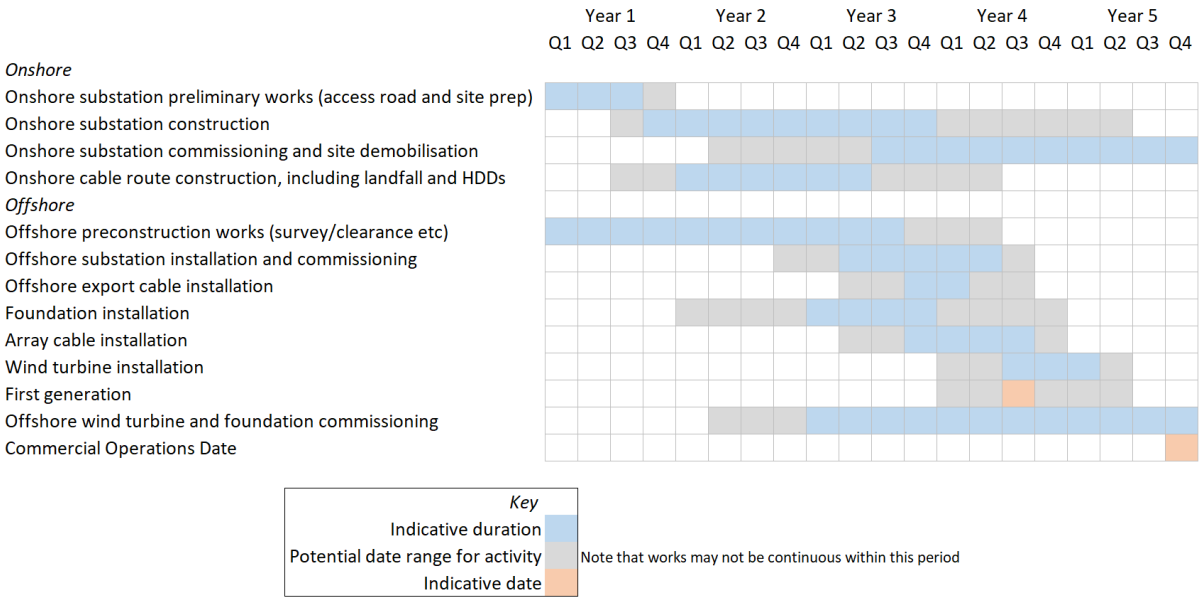


Figure 2: Indicative construction programme.

1.6 Pre-construction works

1.6.1 Pre-construction surveys

32 Geophysical and geotechnical surveys would be carried out before works commence and the information from those surveys would allow route debris, boulders, archaeological features, Unexploded Ordnance (UXO) presence, seabed features, sediment depth and the nature of the seabed to be determined. An analysis of these factors would then inform the final locations of WTGs (micrositing), the requirement for foundation drilling, installation methods for the final cable route taken, the target cable burial depth, and what (if any) additional cable protection would be required. Micrositing is intended to provide flexibility to make minor adjustments to the project layouts to accommodate unexpected on-site conditions encountered in the pre-construction surveys.

33 The surveys will include grab sampling of seabed sediment, and if necessary for pre-construction surveys, biological sampling will take place.

34 Prior to any survey, pre-construction, construction or major O&M works, it may be necessary to remove or re-locate static fishing gear (for example pots). Other users of the sea, including commercial fisheries, will be contacted in advance via Notices to Mariners (NtMs) secured through a Marine Licence condition to inform them of upcoming activities to allow time for removal or re-location of static gear to take place.

1.6.2 Seabed preparation

35 Depending on the foundation types chosen for WTGs and OSPs (see Section 1.8.8), some form of seabed preparation may be required to provide a clear and level surface for foundation installation, which may include seabed levelling and removing debris.

36 Some foundations, in particular larger GBS foundations, need to be placed on prepared areas of seabed due to their size. Seabed preparation involves levelling and/ or dredging of soft mobile sediments as required, as well as boulder and obstacle removal. It is likely that dredging would be required in the case of GBS foundations. If required, this would be carried out by dredging vessels and the spoil would be deposited on the seabed within a licensed disposal area within the array. In some cases, it may be required to place a layer of gravel on the seabed prior to the installation of GBS foundations to provide a clear, level surface.

37 Methods for seabed preparation include Mass or Controlled Flow Excavation (MFE/ CFE) or dredging (such as Trailing Suction Hopper Dredging (TSHD), backhoe dredging or water injection dredging). The design envelope for seabed preparation for the different foundation types is discussed in detail within the foundation-specific Sections 1.8.3 to 1.8.5.

1.6.3 Sandwave clearance

38 In some areas within the AyM array area and offshore ECC, existing sandwaves and similar bedforms may be required to be cleared or levelled before array and offshore export cables are installed. This is done for two reasons:

- Many of the cable installation tools require a relatively flat surface in order to achieve cable burial to the target depth. It may not be possible to successfully bury a cable on a slope above a critical gradient; and
- The cable must be buried to a depth where it is expected to stay buried throughout the lifetime of the project. Sandwaves are generally mobile features that migrate naturally. Over time, sandwave migration can cause cables to become exposed if they are not sufficiently cleared before cable installation.

39 The design envelope for sandwave clearance is described within the array cable and offshore export cable sections (Section 1.6.2). If seabed material is dredged, it will be disposed of in a licensed disposal area within the array and/or offshore ECC.

1.6.4 Unexploded ordnance clearance

40 In the offshore wind industry, it is common to encounter UXO originating from World War I and World War II prior to construction during surveys. This poses a health and safety risk where it coincides with the planned locations of infrastructure and vessel activity, and therefore it is necessary to survey for and carefully manage any items of UXO that are discovered.

41 If found, a risk assessment will be undertaken and items of UXO are either avoided, removed or detonated *in situ*. Recent advancements in the available methods for UXO clearance mean that high-order detonation may be avoided. The methods of UXO clearance considered for AyM may include:

- High-order detonation;
- Low-order detonation (deflagration);
- Removal/ relocation; and
- Other less intrusive means of neutralising the UXO.

42 As explained in Section 1.6.1, detailed pre-construction surveys will be completed post-consent to determine the precise nature of the seabed. As the detailed pre-construction surveys have not yet been completed, it is not possible at this time to determine how many items of UXO will require clearance. As a result, whilst the ES assesses the effects of UXO clearance, the activity itself is not the subject of the application. Instead, a separate Marine Licence will be applied for post-consent for the clearance (where required) of any UXO identified. In order to define the design envelope for consideration of UXO within the EIA, a review of recent information has been undertaken, in conjunction with experience from nearby offshore wind farms (including GyM).

43 It should be noted that AyM is generally in an area considered to be low risk for UXO when compared to areas of the Irish Sea closer to Liverpool and for other recent wind farm projects in the southern North Sea; indeed, the construction of GyM required the clearance of only three items of UXO. The Applicant commissioned a study to establish the potential for UXO presence at AyM. Based on the results of this study and a conservative estimate, the design envelope for UXO clearance is described in Table 4.

Table 4: Design envelope for UXO clearance.

PARAMETER	DESIGN ENVELOPE
Expected total number of potential UXO targets	373
Expected total number of potential UXO targets requiring inspection	52
Expected number of UXO requiring clearance in the pre-construction phase	10
Maximum number of clearances in one day	2

1.6.5 Boulder clearance

44 As described in Section 1.6.1 above, geophysical surveys will be undertaken post-consent to inform the seabed surface boulder clearance requirements. Where large volumes of boulders are present, micrositing of cables around these may not be possible. If left *in situ*, boulders would present the following risks to AyM:

- Exposure of cables and/ or not achieving target burial depth for cables;
- Obstruction risk to the cable installation equipment leading to damage and/or delays;
- Risk to WTG or foundation installation jack-up vessels during jacking operations; and
- Risk of damage to the cable assets themselves.

45 Boulders may be cleared using a number of methods, depending on the density of boulders encountered. Where boulders are present in high density, a boulder clearance tool or SCAR plough may be employed. In areas of low density, it may be more efficient to use a grab to target and re-locate individual boulders.

46 For the purpose of determining a design envelope for boulder clearance, it is assumed that 100% of the array cable and offshore export cable lengths will require boulder clearance, however this is expected to be greatly reduced once the results of pre-construction surveys are known. The design envelope for boulder clearance is described within the array cable and offshore export cable sections (Section 1.8.10).

1.6.6 Pre-lay grapnel run

47 Following the pre-construction route survey and boulder clearance works, a Pre-Lay Grapnel Run (PLGR) may be undertaken prior to cable installation. A vessel will be mobilised with a series of grapnels, chains, recovery winch and suitable survey spread.

48 These works will take place within the seabed preparation footprint for subsea cables described in Section 1.8.10.

1.7 Construction vessel requirements

1.7.1 Construction vessel numbers and round trips

49 The peak number of vessels on-site at any one time during the construction phase and the number of round trips between port and site (defined as a vessel movement from port to site and back to port) are summarised in Table 5. It should be noted that many parts of the construction cannot be undertaken concurrently and so the values in Table 5 which are for the total MDS are not representative throughout the majority of the construction period. It is also assumed that a total of up to 530 annual helicopter round trips by up to two helicopters may be made in the construction phase.

50 Vessels will, when necessary, undertake wet storage techniques for anchors and infrastructure across the Order Limits.

Table 5: Peak construction vessels and round trips to site.

VESSEL TYPE	PEAK VESSELS	ROUND TRIPS	
		LARGER WTG	SMALLER WTG
Foundations			
WTG foundation installation vessels (includes tugs and feeders)	16	136	133
OSP foundation installation vessels	8	16	
TP installation vessels	6	27	24
Scour protection installation vessels (including filter layer and seabed preparation)	6	87	170

VESSEL TYPE	PEAK VESSELS	ROUND TRIPS	
		LARGER WTG	SMALLER WTG
GBS ballast installation	2	371	315
WTGs and OSPs			
WTG installation vessels (includes tugs and feeders)	15	31	45
OSP topside installation vessels	4	8	
Other installation vessels			
Commissioning vessels	3	78	
Accommodation vessels	2	52	
Other (including Crew Transfer Vessels (CTVs), guard vessels and support vessels)	15	2,300	
Cable installation vessels			
Array cable installation vessels (includes support, cable protection and anchor handling vessels)	12	23 (plus 84 for cable protection vessels)	
Export cable installation vessels (including at landfall) (includes support, cable protection and anchor handling vessels)	12	23 (plus 164 for cable protection vessels)	
Total construction vessels			

VESSEL TYPE	PEAK VESSELS	ROUND TRIPS	
		LARGER WTG	SMALLER WTG
Maximum total construction vessels	101	3,399	3436
Indicative peak vessels on-site simultaneously	35	N/A	

1.7.2 Jack-up operations and anchoring

51 Jack-Up Vessels (JUVs) are installation vessels that are capable of lowering three or more legs onto the seabed and lifting themselves out of the water to provide a stable platform where craning of heavy infrastructure such as foundations, WTGs and OSP topsides can take place. The legs of the JUV have direct impacts on the seabed within the footprint of the feet, known as 'spud cans'.

52 Alternatively, multiple anchors may be used to position and secure the vessel, which will also have direct impacts on the seabed and are considered within the overall footprint of the project. Anchor handling and deployment of anchors may be required outside of the Order Limits. In addition, vessels may be required to anchor in and around the Order Limits for the purposes of maritime navigational safety. Anchoring is not a licensable activity under the Marine and Coastal Access Act (MCAA) 2009.

53 For WTG, OSP and met masts, the methodologies available for installation include JUV operations and anchoring. Therefore, the values in the tables below are not additive as the two activities are mutually exclusive.

54 Table 6 describes the design envelope for JUV operations and Table 7 describes the anchor handling footprints in the construction phase.

Table 6: Design envelope for JUV operations.

PARAMETER	DESIGN ENVELOPE
Individual spud can footprint (m^2)	275
Maximum seabed area per vessel (m^2)	1,100 (note JUVs with greater numbers of legs have a smaller individual leg footprint)
Typical seabed penetration (m)	0 – 15
Total jack-up operations during construction	312
Maximum seabed area impacted (m^2)	343,200

Table 7: Design envelope for anchor footprints.

PARAMETER	DESIGN ENVELOPE
WTG, OSP and met mast installation (foundations and topsides)	
Number of anchors per deployment	8
Anchor footprint (deployment and recovery per anchor) (m^2)	116
Typical anchor penetration depth (m)	4
Number of deployments per location	5 (4 for foundation installation, 1 for WTG/ OSP topside installation)
Total impact area (m^2)	242,112
Total impact volume (m^3)	968,448
Array cable installation	
Number of anchors per deployment	9

PARAMETER	DESIGN ENVELOPE
Anchor footprint (deployment and recovery per anchor) (m^2)	61
Typical anchor penetration depth (m)	1.5
Number of deployments	264
Total impact area (m^2)	144,077
Total impact volume (m^3)	216,115
Export cable installation	
Number of anchors per deployment	9
Anchor footprint (deployment and recovery per anchor) (m^2)	61
Typical anchor penetration depth (m)	1.5
Number of deployments	143
Total impact area (m^2)	78,204
Total impact volume (m^3)	117,306

1.8 Offshore infrastructure

1.8.1 Foundation options

55 The WTGs, OSPs and met mast are secured to the seabed via foundation structures. There are a number of foundation types that are being considered for AyM, with the final design selection being dependent on factors including physical and environmental constraints, project economics, and supply chain strategy.

56 Table 8 below describes which foundation options are considered within the design envelope for AyM. The only foundation option considered for the met mast is a monopile, and this would be smaller than those considered for WTGs.

57 Further detail on the maximum design parameters for the different foundation options is provided in Sections 1.8.3 to 1.8.5, below.

Table 8: Foundation options considered for AyM infrastructure.

FOUNDATION OPTIONS	AYM INFRASTRUCTURE		
	WTG	OSP	MET MAST
Monopile	Yes	Yes	Yes
Alternative monopile configuration (see paragraph 65 *et seq.*)	No	Yes	No
Multi-leg pin-piled jacket	Yes	Yes	No
Mono suction caisson	Yes	No	No
Multi-leg suction caisson jacket	Yes	Yes	No
Mono GBS	Yes	Yes	No
Multi-leg GBS jacket	Yes	Yes	No

1.8.2 Scour protection

58 Scour protection is designed to prevent foundation structures from being undermined by hydrodynamic and sedimentary processes, resulting in seabed erosion and subsequent scour pit formation. The shape of a foundation structure is an important parameter in influencing the potential depth of scour pits, as well as the local hydrodynamic regime and seabed sediment conditions. Scour around foundations is usually mitigated by the use of scour protection measures, which include concrete mattresses, bagged solutions (containing rock/sand or similar), protective aprons/coverings, and flow energy dissipation devices (such as frond mats). The most common type of scour protection, however, is the placement of loose crushed rock around the base of the foundation (rock placement) (see also paragraph 123 *et seq.* on cable protection, which describes these methods in more detail).

59 A typical scour protection solution may comprise a rock armour layer resting on a filter layer of smaller graded rocks. The scour protection can either be installed before or after the foundation is installed. Alternatively, by using a heavier rock material with a larger gradation, it is possible to avoid using a filter layer and install a single layer of scour protection.

60 The amount of scour protection required will vary depending on the foundation type selected. Flexibility in scour protection choice is required to ensure that anticipated changes in available technologies and foundation design can be accommodated within the design envelope. The final choice of scour protection solution will be made post-consent in the detailed design phase, taking into account geotechnical data, meteorological and oceanographic conditions, water depth, foundation type and maintenance strategy. The design envelope for scour protection is described in the tables for each foundation type in Section 1.8.3 to 1.8.5.

1.8.3 Piled foundations

61 Piled foundations are anchored via tubular piles driven into the seabed to the required depth, usually by impact piling, but may also be vibro-piled or drilled, or a combination.

Monopile

62 Monopile foundations typically consist of a single tubular section, consisting of a number of rolled steel plates welded together, which is driven into the seabed, usually via impact or vibro-piling. A Transition Piece (TP) may be fitted over the monopile and secured via bolts or grout. The TP may feature a boat landing, ladders, a small crane and other ancillary components as well as a flange for connection to the WTG tower. The TP is typically painted yellow and marked according to the relevant regulatory guidance and may be installed at a separate time to the monopile itself. As an alternative to a TP, it may be possible to have an extended monopile. In this case, the ancillary components and regulatory markings are applied directly to the upper section of the monopile instead. An example of a monopile foundation is illustrated in Figure 3 and the design envelope for this foundation type is described in Table 9.

63 Monopiles and transition pieces will be transported to site either on the installation vessel itself or on feeder barges as described in Section 1.7. Once on site, the monopiles will typically be installed using the following process:

- The monopile is lifted into the pile gripper on the side of the installation vessel;
- The hammer (see paragraph 69 *et seq.*) is lifted onto the monopile;
- The monopile is driven into the seabed until the required embedment depth is achieved;
- In the event of pile refusal, relief drilling may be necessary to embed the pile to the required depth;
- The TP is lifted onto the monopile; and
- The TP is secured using bolts or grout.

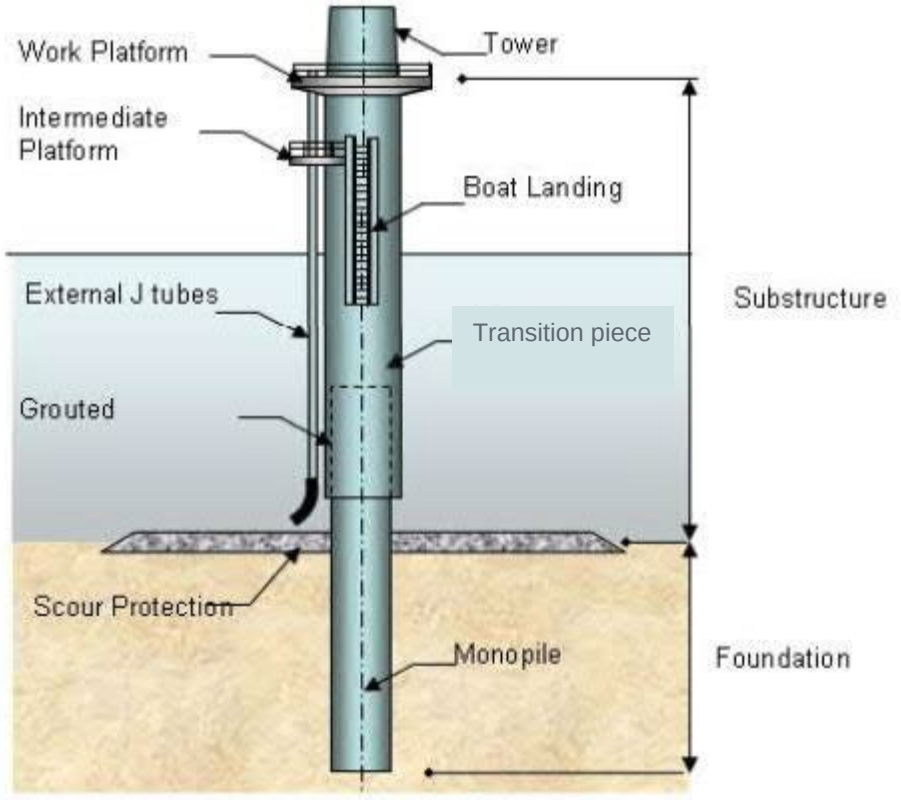


Figure 3: Monopile foundation with TP.

64 Seabed preparation for monopiles is usually minimal and may not be required at all. If pre-construction surveys show the presence of boulders or other seabed obstructions at foundation locations, these may be removed (as described in Section 1.6.5) if the foundation cannot be microsited to avoid the obstruction.

65 For OSPs, an alternative monopile configuration is considered. OSPs may be installed either:

- **Option A:** On a single monopile (as is the case for WTGs);
- **Option B:** On up to six smaller diameter monopiles (up to 8 m) in a rectangular configuration.

Table 9: Design envelope for monopiles.

PARAMETER	DESIGN ENVELOPE			
	LARGER WTG	SMALLER WTG	OSP	MET MAST
Number of monopiles	34	50	Option A: 2 Option B: 12	1
Diameter (m)	15	13	Option A: 15 Option B: 8	5
Footprint (excluding scour protection) per foundation (m^2)	177	133	Option A: 177 Option B: 302	20
Total seabed footprint (excluding scour protection) (m^2)	6,008	6,637	Option A: 353 Option B: 603	20
Typical embedment depth (m)	65	55	60	30
Hammer energy (kJ)	5,000	5,000	5,000	3,000
Drilling				

PARAMETER	DESIGN ENVELOPE			
	LARGER WTG	SMALLER WTG	OSP	MET MAST
Foundations requiring drilling (%)	100	100	100	100
Drill diameter (m)	16	14	16	5
Typical drill penetration depth (m)	68	59	60	30
Indicative volume of drill arisings per pile (m^3)	13,572	9,005	12,064	589
Total drill arisings (m^3)	276,862	270,161	24,127	589
Seabed preparation				
Seabed preparation for monopiles is expected to be minimal and typically limited to within the footprint of clearance for boulders, UXO and sandwaves. The total extent of seabed preparation will be significantly lower than for GBS foundations (Section 1.8.5).				
Scour protection				
Typical scour protection depth (m)	2	2	2	2
Diameter of scour protection at	83	73	Option A: 98 Option B: 120 x 90 rectangle	33

PARAMETER	DESIGN ENVELOPE			
	LARGER WTG	SMALLER WTG	OSP	MET MAST
seabed level (including foundation footprint) (m)				
Area of scour protection (including foundation footprint) (m^2)	5,411	4,185	Option A: 7,543 Option B: 10,800	855
Volume of scour protection per foundation (m^3)	9,450	7,213	Option A: 13,526 Option B: 21,600	1,282
Total area of scour protection (including foundation footprint (m^2)	183,961	209,269	Option A: 15,086 Option B: 21,600	855
Total volume of scour protection required (m^3)	321,250	360,650	Option A: 27,050 Option B: 43,200	1,282

Multi-leg pin-piled jacket

66 Multi-leg pin-piled jacket foundations are formed of a steel lattice construction comprising tubular steel supports and welded joints. These are secured to the seabed by steel pin-piles that are similar in construction to monopiles (though typically smaller in diameter) attached to the jacket feet. Unlike monopiles, there is no need for a separate TP, since the TP and ancillary structure is typically fabricated as an integral part of the jacket. An example of a multi-leg pin-piled jacket foundation is illustrated in Figure 4 and the design envelope for this foundation type is described in Table 10.

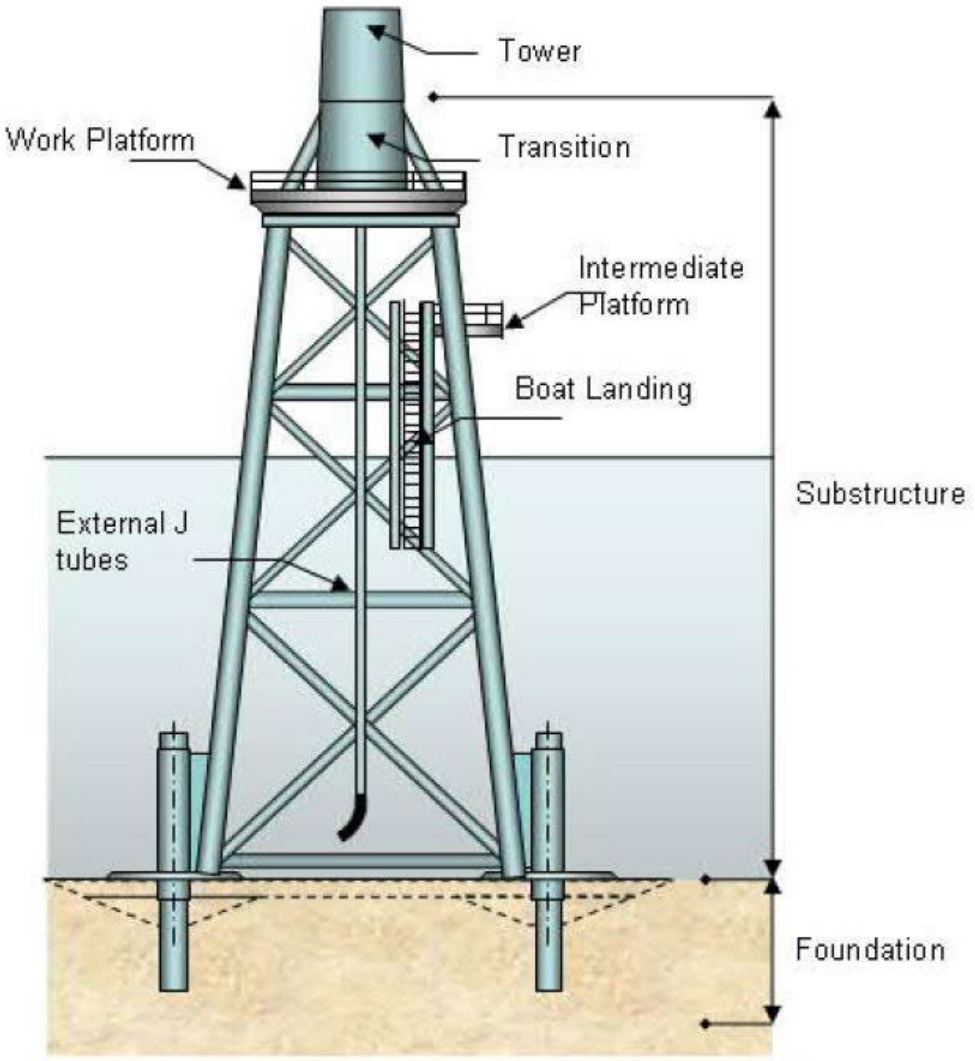


Figure 4: Wind turbines on multi-leg jacket foundations.

67 The installation sequence will be similar to that of monopiles (paragraph 62 *et seq.*), with the structures transported to site by installation vessels or feeder barges, where they will be lowered onto the seabed. The pin-piles can either be installed before or after the jacket is lowered to the seabed. If before, a piling template is typically lowered onto the seabed to guide the pin-piles to the exact required locations. The piles are then installed through the template, which itself is then recovered to the installation vessel, and subsequently the jacket is fixed atop the pin-piles by grout or other means such as welding. Alternatively, the need for a piling template can be negated by installing the pin-piles after the jacket has been placed on the seabed.

68 Because jacket foundations typically have a larger seabed footprint compared to monopiles, some degree of seabed preparation is usually necessary to clear obstacles and provide a level surface for jacket installation.

Table 10: Design envelope for multi-leg pin-piled jackets.

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Number of jacket foundations	34	50	2
Separation of adjacent legs at seabed level (m)	40	30	50
Separation of adjacent legs at sea level (LAT) (m)	30	25	40
Number of legs per foundation	4	4	6
Pin-piles per leg	1	1	2
Total pin-piles	136	200	24

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Pin-pile diameter (m)	3.5	3.5	3.5
Footprint of pin-piles (excluding scour protection) per pin-pile (m^2)	9.6	9.6	9.6
Total seabed footprint (excluding scour protection) (m^2)	1,306	1,924	231
Typical pin-pile embedment depth (m)	60	60	60
Hammer energy (kJ)	3,000	3,000	3,000
Drilling			
Foundations requiring drilling (%)	100	100	100
Drill diameter (m)	3.5	3.5	3.5
Typical drill penetration depth (m)	60	60	60
Typical drilling rate (m/hr)	0.25-2	0.25-2	0.25-2
Volume of drill arisings per pile (m^3)	577	577	577
Total drill arisings (m^3)	78,508	115,454	13,854
Seabed preparation			

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Seabed preparation for piled jacket foundations is expected to be minimal and typically limited to within the footprint of clearance for boulders, UXO and sandwaves. The total extent of seabed preparation will be significantly lower than for GBS foundations (Section 1.8.5).			
Scour protection			
Typical scour protection depth (m)	2	2	2
Diameter of scour protection at seabed level per foundation (including foundation footprint) (m)	22	22	Rectangular 120 x 90
Area of scour protection per foundation (including foundation footprint) (m^2)	1,521	1,521	10,800
Volume of scour protection per foundation (m^3)	1,959	1,959	21,600
Total area of scour protection (including foundation footprint (m^2)	51,698	76,027	21,600
Total volume of scour protection required (m^3)	66,550	97,900	43,200

Piling techniques, soft start and ramp up

69 The most common method of installing driven piles is to use a percussive hammer. Impact piling is presented as the basis for the design envelope, however alternative piling methods such as vibro-piling, Blue Piling or HiLo Impact may also be considered as technologies that reduce the source level of underwater noise compared to impact piling. The suitability of such technologies would be informed by pre-construction surveys post-consent.

70 For impact piling, the hammer would use a maximum energy of 5,000 kJ for monopiles and 3,000 kJ for pin-piles. Piling for both scenarios would include the use of a soft start at 15% of the maximum hammer energy, followed by a 'ramp up' to the required hammer energy (see the Schedule of Mitigation (application ref: 8.11).

71 In the case of monopiles, piling will only occur at one location at a time – there is no possibility of simultaneous or concurrent piling. In the case of pin-piled multi-leg jacket foundations, pin-piles may be installed concurrently, but only on adjacent legs of the same jacket foundation – there is no possibility of simultaneous or concurrent piling at two separate foundation locations.

72 The maximum soft start and ramp up scenarios are described in Table 11 below and have been modelled as detailed within Volume 2, Annex 6.2: Subsea Noise Technical Report (application ref: 6.4.6.2).

Table 11: Piling scenarios.

PARAMETER	SOFT START	RAMP UP				MAX
Monopile						
Hammer energy (kJ)	750	1,000	2,000	3,000	4,000	5,000
Strikes	100	100	340	680	1,020	6,528
Duration (s)	600	600	600	1,200	1,800	11,520

PARAMETER	SOFT START	RAMP UP				MAX
Strike rate (strikes per minute)	10	10	34	34	34	34
Pin-pile						
Hammer energy (kJ)	450	600	1,200	1,800	2,400	3,000
Strikes	100	100	340	680	1,020	5,100
Duration (s)	600	600	600	1,200	1,800	9,000
Strike rate (strikes per minute)	10	10	34	34	34	34

Drilling

73 If piling is not possible due to the presence of rock or hard ground conditions, the material inside the pile may be drilled out to facilitate driving the pile to its required embedment depth. This can be done either in advance of piling, or if the embedment rate slows significantly during piling (such as in the event of pile refusal).

74 Various drilling methodologies are possible, but drills are typically lifted by crane into a part-installed pile, ride inside the pile during drilling, and are removed in the event driving recommences. Drills may only bore out to a diameter equal to the internal diameter of the pile, or they may be capable of expanding their cutting disk below the tip of the pile and boring out to the pile's maximum outer diameter or greater (known as under-reaming).

75 Drilling systems are available in sizes ranging from those required for small jacket pin piles, to large diameter monopiles. Water is continuously pumped into the drill area and any drill arisings generated are flushed out and allowed to disperse at the surface, falling to the seabed in the vicinity of the pile.

76 It may be necessary to adopt a drive-drill-drive sequence depending on ground conditions. Other similar sequences of drilling and driving are also possible. The design envelope for drilling scenarios is described for the piled solutions above. In the case of piled jacket foundations, drilling may take place at the same time as piling or drilling at an adjacent jacket leg.

1.8.4 Suction caisson foundations

77 Suction caisson foundations are secured to the seabed via hollow steel cylinders, capped at the upper end. They are typically larger in diameter compared to driven piles, but do not require a hammer or drill for installation. Instead, the foundation is lowered into place to form a seal between the seabed and the suction caisson structure, after which powerful pumps remove the seawater from inside the caisson to create a vacuum which pulls the foundation down into the seabed to the required embedment depth. If necessary, the void between the caisson and the seabed may be filled with grout or a similar material.

Mono suction caisson

78 A mono suction caisson foundation is similar in construction to a monopile but consists of a single suction caisson at its base supporting a single monopile structure. An example of a mono suction caisson foundation is illustrated in Figure 5, and the design envelope for this foundation type is described in Table 12.

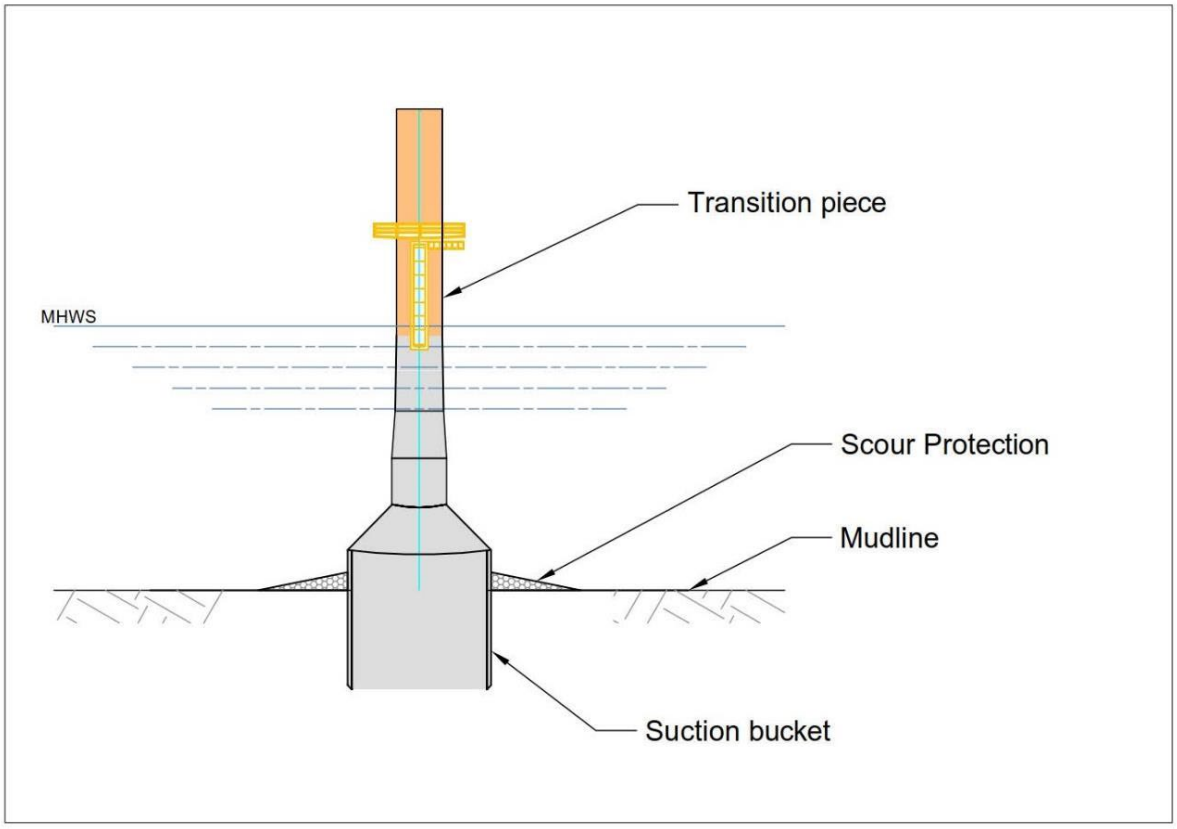


Figure 5: Mono-suction caisson foundations.

Table 12: Design envelope for mono suction caisson foundations.

PARAMETER	DESIGN ENVELOPE	
	LARGER WTG	SMALLER WTG
Number of foundations	34	50
Suction caisson diameter (m)	35	35
Monopile diameter at sea surface (LAT) (m)	15	15
Typical suction caisson penetration depth (m)	25	25
Height of suction caisson above seabed level (m)	8	8

PARAMETER	DESIGN ENVELOPE	
	LARGER WTG	SMALLER WTG
Footprint of suction caissons (excluding scour protection) per foundation (m^2)	962	962
Total seabed footprint (excluding scour protection) (m^2)	32,712	48,106
Seabed preparation		
Total area of seabed preparation required (including foundation footprint) (m^2)	32,712	48,106
Typical depth of seabed preparation required (m)	4	4
Volume of sediment disturbed by seabed preparation (m^3)	130,847	192,423
Scour protection		
It is assumed that for WTG mono suction caisson foundations, the scour protection envelope will not exceed the maximum parameters described for multileg GBS foundations in Section 1.8.5.		

Multi-leg suction caisson jacket

79 Multi-leg suction caisson jacket foundations are similar in construction to a multi-leg pin-piled jacket foundation consisting of a steel lattice structure (paragraph 66 *et seq.*) but are secured to the seabed via three or more suction caissons, rather than pin-piles. An example of a multi-leg suction caisson foundation is illustrated in Figure 6, and the design envelope for this foundation type is described in Table 13.

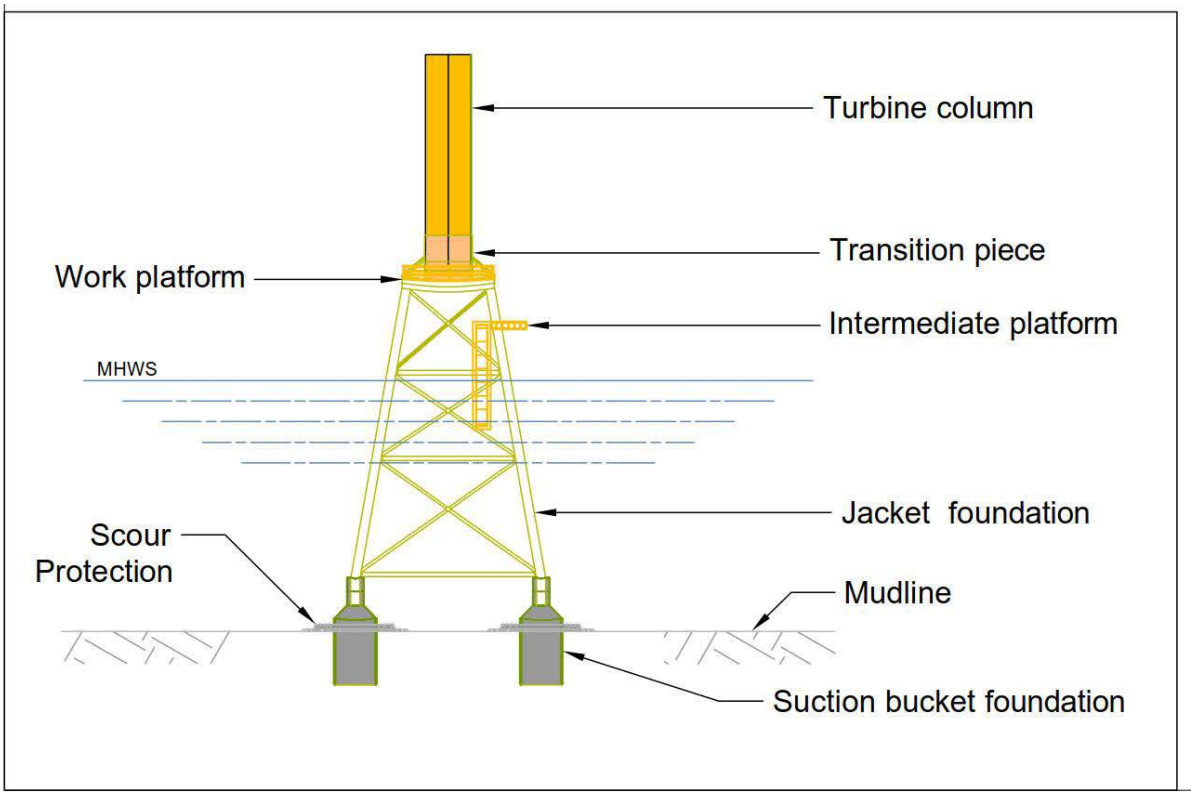


Figure 6: A multi-leg suction caisson jacket foundation.

Table 13: Design envelope for multi-leg suction caisson jacket foundations.

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Number of foundations	34	50	2

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Separation of adjacent legs at seabed level (m)	40	30	50
Separation of adjacent legs at sea level (LAT) (m)	30	25	40
Number of legs per foundation	4	4	6
Suction caisson diameter (m)	20	15	20
Typical suction caisson penetration depth (m)	25	25	25
Height of suction caisson above seabed level (m)	5	5	5
Footprint of suction caissons (excluding seabed preparation and scour protection) per suction caisson (m^2)	314	177	314
Total seabed footprint (excluding seabed preparation and scour protection) (m^2)	42,726	35,343	3,770
Seabed preparation			
Total area of seabed preparation required (including foundation footprint) (m)	66,759	62,832	8,482

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Typical depth of seabed preparation required (m)	4	4	4
Volume of sediment disturbed by seabed preparation (m^3)	267,035	251,327	33,929
Scour protection			
It is assumed that for multileg suction caisson foundations, the scour protection envelope will not exceed the maximum parameters described for multileg GBS foundations in Section 1.8.5.			

1.8.5 GBS foundations

80 GBS foundations are heavy steel and/or concrete structures, sometimes incorporating additional ballast material, that sit on the seabed. GBS foundations vary in shape but are normally significantly wider at the seabed level to provide support and stability to the structure. Generally, they then taper to a smaller width at the sea surface level. GBS foundations also often include skirts that embed into the seabed under the weight of the structure to improve the natural stability and scour resistance of the foundation.

81 GBS foundations do not require percussive piling and are not attached directly to the seabed. Instead, they rely on their weight to provide stability to the structure above. GBS foundations are typically hollow and can be floated to site before being filled with ballast to sink the foundation to its required position.

82 GBS foundations in particular can require significant seabed preparation in order to provide a clear and level surface for installation (Section 1.6.2). In some cases, a layer of gravel may also be laid on the seabed to provide this level surface.

Mono GBS

83 Mono GBS foundations consist of a single GBS structure supporting a monopile structure, similar in appearance to a mono suction caisson, with a significantly wider base. An example of a mono GBS foundation is illustrated in Figure 7, and the design envelope for this foundation type is described in Table 14.

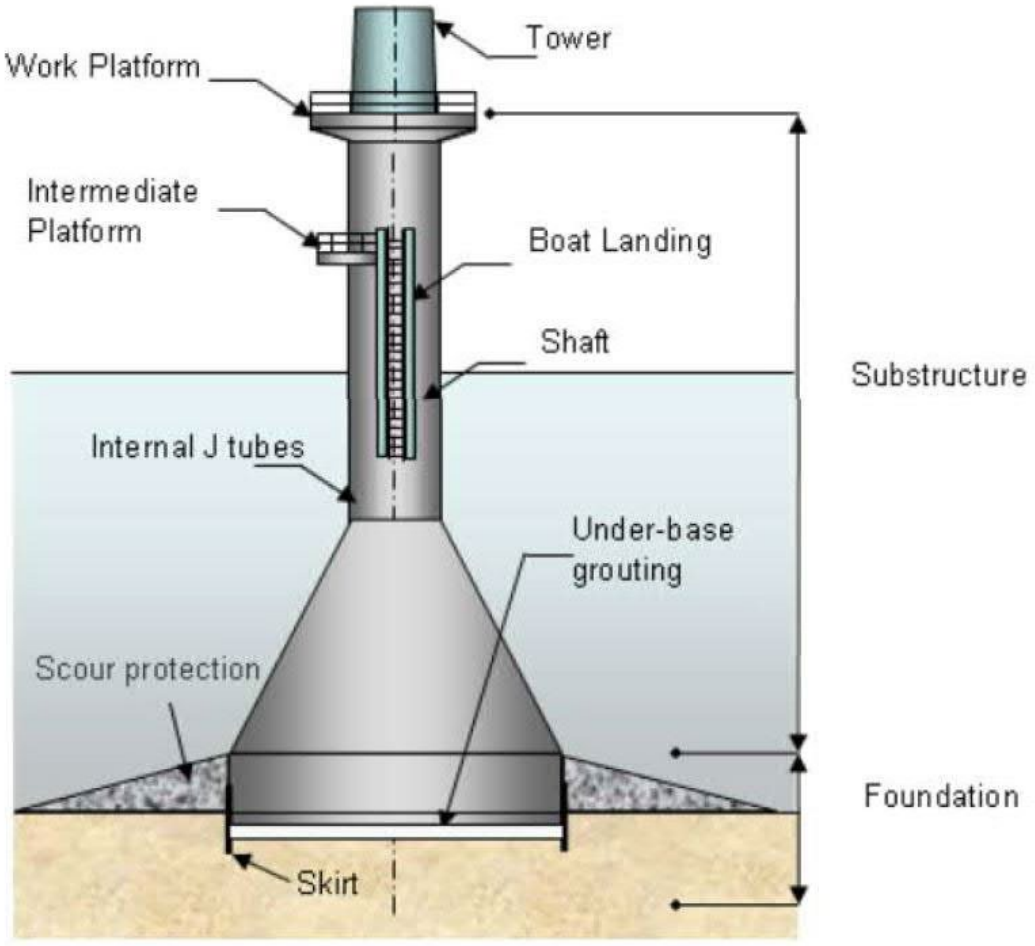


Figure 7: A mono GBS foundation.

Table 14: Design envelope for mono GBS foundations.

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Number of jacket foundations	34	50	2
GBS diameter (m)	55	45	55 (round base)
Shaft diameter at sea surface (LAT) (m)	15	15	15
Footprint of foundation (including seabed preparation but excluding scour protection) per foundation (m^2)	2,827	1,963	7,000 (rectangular base)
Total seabed footprint (including seabed preparation but excluding scour protection) (m^2)	96,133	98,175	14,000 (rectangular base)
Seabed preparation			
Seabed preparation diameter per foundation (m)	60	50	65 (or 100 x 70 rectangular base)
Seabed preparation area per foundation (m^2)	2,827	1,963	7,000

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Total area of seabed preparation required (including foundation footprint (m)	96,133	98,175	14,000
Indicative average depth of seabed preparation required (m)	2	2	4
Volume of sediment disturbed by seabed preparation (m^3)	192,265	196,350	56,000
Gravel bed requirements			
Area of gravel bed (m^2) per foundation	2,827	1,963	7,000
Thickness of gravel bed (m)	1	1	1
Volume of gravel bed per foundation (m^3)	2,827	1,963	7,000
Total area of gravel bed required (m^2)	96,133	98,175	14,000
Total volume of gravel bed required (m^3)	96,133	98,175	14,000
Surface area			

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Surface area of water facing structure per foundation (m^2)	4,250	3,650	4,950
Total surface area of water facing structure (m^2)	144,500	182,500	9,900
Scour protection			
Scour protection depth (m)	2	2	2
Diameter of scour protection at seabed level (including foundation footprint) (m)	146	121	120 x 90 (rectangular base)
Area of scour protection (including foundation footprint) (m)	16,627	11,404	10,800
Volume of scour protection per foundation (m^3)	26,699	18,138	13,600
Total area of scour protection (including foundation footprint (m^2)	565,321	570,209	21,600

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Total volume of scour protection required (m^3)	907,773	906,919	27,200

Multi-leg GBS jacket

84 Multi-leg GBS foundations are similar in appearance to multi-leg suction caisson foundations, but with multiple GBS structures at the base of the legs rather than suction caissons. An example of a multi-leg GBS foundation is illustrated in Figure 8, and the design envelope for this foundation type is described in Table 15.

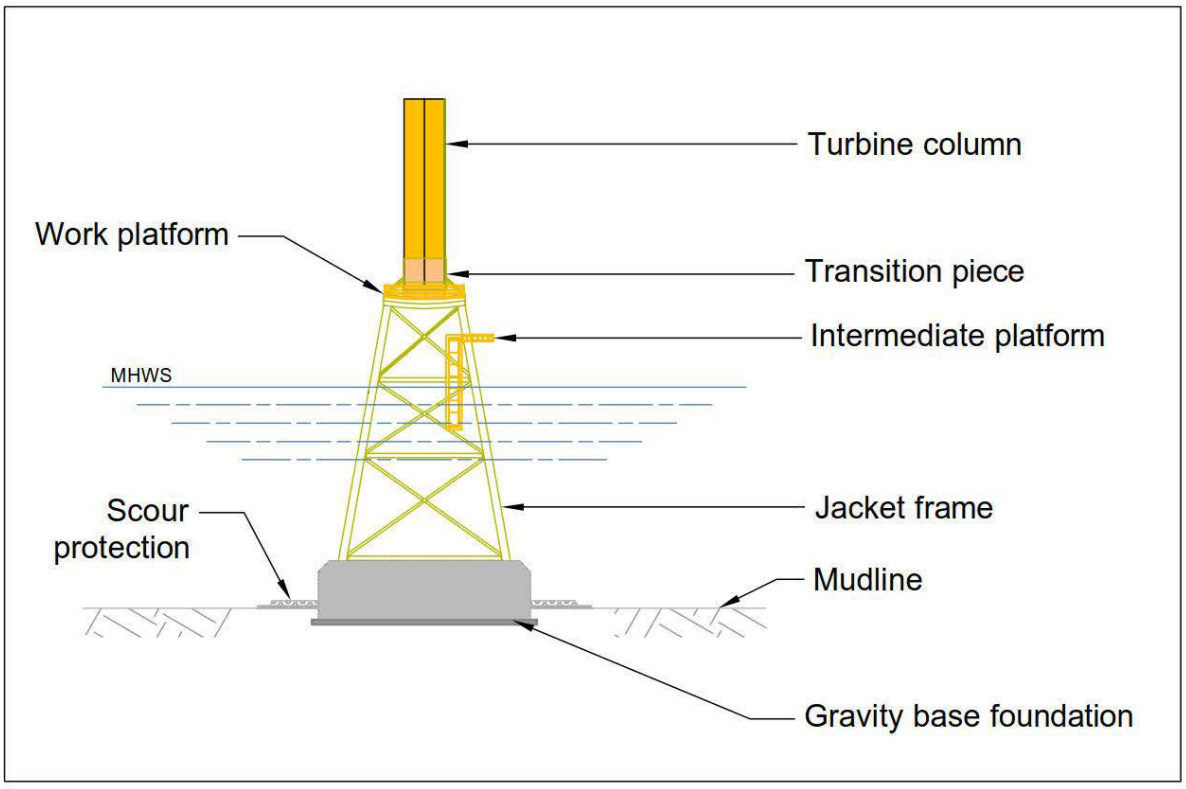


Figure 8: Multi-leg GBS jacket foundation with a single base.

Table 15: Design envelope for multi-leg GBS foundations.

PARAMETER		DESIGN ENVELOPE		
		LARGER WTG	SMALLER WTG	OSP
Number of jacket foundations		34	50	2
Separation of adjacent legs at seabed level (m)		40	30	50
Separation of adjacent legs at sea level (LAT) (m)		30	25	40
Number of bases per foundation		4	4	6
GBS diameter (m)	One base per leg	20	20	20
	Single base	50 x 50	40 x 40	65 x 95
Height of GBS above seabed level (m)		8	8	8
Footprint of foundation (including seabed preparation but excluding scour protection) per base (m^2)	One base per leg	490.9	490.9	314
	Single base	3,600	2,500	10,800

PARAMETER		DESIGN ENVELOPE		
		LARGER WTG	SMALLER WTG	OSP
Total seabed footprint (including seabed preparation but excluding scour protection) (m^2)	One base per leg	66,759	98,175	3,770
	Single base	122,400	125,000	21,600
Seabed preparation				
Seabed preparation diameter per leg (m)	One base per leg	25	25	30
	Single base	60	50	N/A (rectangular base)
Seabed preparation area per base (m^2)	One base per leg	490.9	490.9	706.9
	Single base	3,600	2,500	10,800
Total area of seabed preparation required (including foundation footprint (m^2)	One base per leg	66,759	98,175	8,482
	Single base	122,400	125,000	21,600

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Depth of seabed preparation required	4	4	4
Volume of sediment disturbed by seabed preparation (m3)	489,600	500,000	86,400
Gravel bed requirements			
Area of gravel bed (m^2) per foundation	3,600	2,500	10,800
Thickness of gravel bed (m)	1	1	1
Volume of gravel bed per foundation (m^3)	3,600	2,500	10,800
Total area of gravel bed required (m^2)	122,400	125,000	21,600
Total volume of gravel bed required (m^3)	122,400	125,000	21,600
Scour protection			
Scour protection depth (m)	2	2	2
Diameter of scour protection at seabed level (including foundation footprint) (m)	78	68	120 x 90
Area of scour protection per foundation (including foundation footprint) (m)	6,084	4,624	10,800

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Volume of scour protection per foundation (m^3)	10,952	8,192	21,600
Total area of scour protection (including foundation footprint) (m^2)	206,856	231,200	21,600
Total volume of scour protection required (m^3)	372,350	409,600	43,200

1.8.6 WTGs

85 The EIA will not be linked directly to the electrical output capacity of individual WTGs or the overall capacity of AyM as it is not considered to be a material factor in the MDS, as described in paragraph 15 *et seq*. Up to 34 large, or up to 50 smaller WTGs are planned for AyM. A range of WTG models will be considered; however, they are all likely to follow the traditional WTG design with three blades and a horizontal rotor axis.

86 The blades are connected to a central hub, forming a rotor that turns generator and in some cases a gearbox. The generator and gearbox are located within a containing structure known as the Rotor Nacelle Assembly (RNA), atop the WTG tower. The RNA is supported by the tower structure which is affixed to the foundation at its base. The RNA is able to rotate or 'yaw' in order to face the oncoming wind direction.

87 WTGs operate within a set wind speed range and have a minimum wind speed at which they start generating electricity, and a maximum wind speed at which the WTG cannot generate and operates in a standby mode. Developments in technology are increasing the range of wind speeds at which WTGs can operate, enabling a gradual ramp up and ramp down of output to support operation of the National Grid.

88 Each WTG will have a minimum clearance between sea level and the lowest position of the blade. The rotor diameter will vary depending on the chosen design. An example of a WTG is illustrated in Figure 9 and the design envelope for WTGs is described in Table 16.

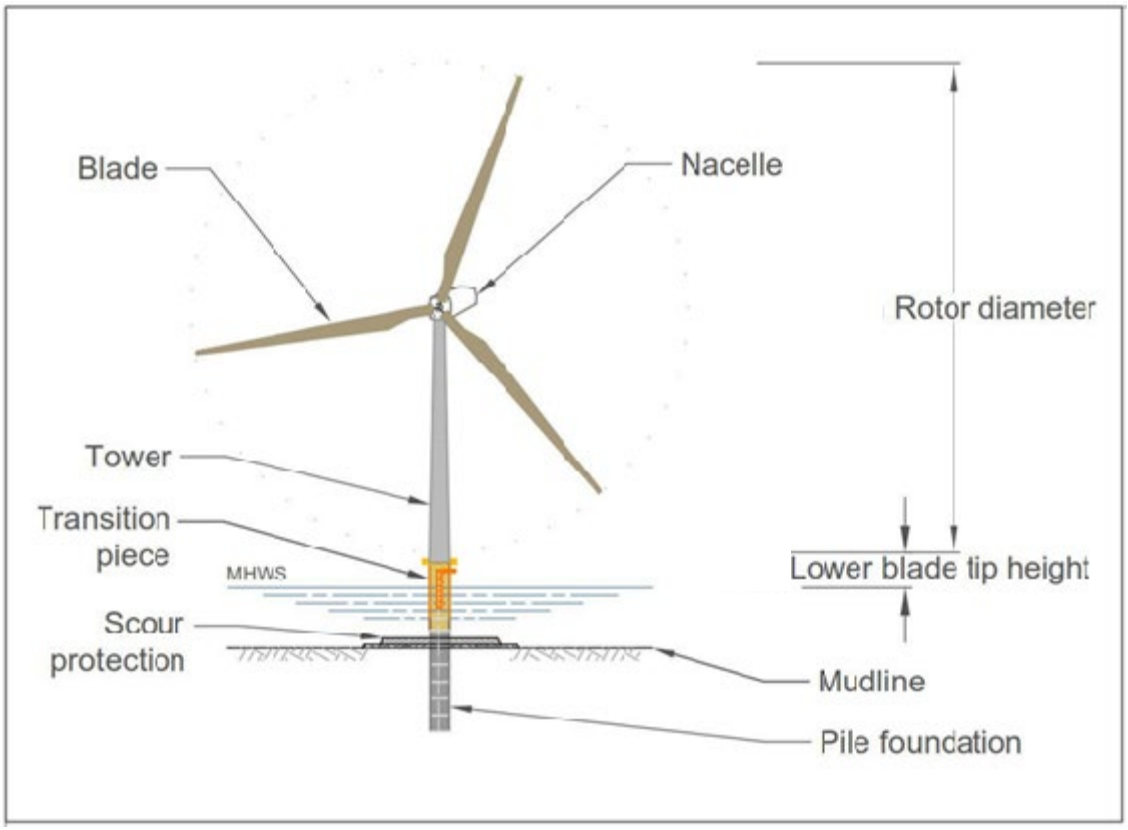


Figure 9: Diagram of an offshore WTG.

Table 16: Design envelope for WTGs.

PARAMETER	DESIGN ENVELOPE	
	LARGER WTG	SMALLER WTG
Number of WTGs	34	50
Minimum lower blade tip height above MHWS (m)	22	22
Maximum upper blade tip height above MHWS (m)	332	282

PARAMETER	DESIGN ENVELOPE	
	LARGER WTG	SMALLER WTG
Rotor diameter (m)	306	250

Access

89 The WTGs may be accessed either from a vessel via a boat landing and ladder on the foundation, via a stabilised gangway directly from a vessel, via a personnel winch system from a vessel, or from a helicopter via a heli-hoist platform on top of the nacelle. Any helicopter access would be designed in accordance with the relevant Civil Aviation Authority (CAA) guidance and standards.

Oils and fluids

90 Each WTG will contain components that require lubricating oils, hydraulic fluids and coolants for operation. Indicative maximum requirements for these fluids are described in Table 17. All oils and fluids will be contained within the WTG in case of a spill.

Table 17: Design envelope for oils and fluids.

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Grease (l)	1,317	838	Minimal
Hydraulic oil (l)	2,487	1,583	Minimal
Gear oil (l)	4,883	3,108	N/A
Nitrogen (l)	159,467	101,479	Minimal
Transformer silicon/ ester oil (l)	17,849	11,358	340,000
Diesel fuel (l)	1,000	1,000	20,000

PARAMETER	DESIGN ENVELOPE		
	LARGER WTG	SMALLER WTG	OSP
Sulphur hexafluoride (SF6) kg)	180	180	5,000
Glycol/ coolant (l)	34,527	21,972	Minimal
Batteries (kg)	4,000	3,000	350,000
Grey water (l)	N/A	N/A	5,000
Black water (l)	N/A	N/A	3,000

Control systems

91 Each WTG has its own control system to carry out functions like yaw control and ramp down in high wind speeds. All the WTGs are also connected to a central Supervisory Control and Data Acquisition (SCADA) system for the control of the wind farm remotely. This allows functions such as remote shut down. The SCADA system will communicate with the wind farm via fibreoptic cables (embedded within the electrical transmission cabling), radio/microwave or satellite links. Individual WTGs can also be controlled manually from control systems within the nacelle or tower base.

92 WTGs may have temporary diesel generators for commissioning and O&M activities, as well as back-up power supply for activities such as crane operation, lighting, ventilation etc.

Installation

93 In general, WTGs are installed via the following process:

- WTG components are picked up from a suitable port facility; most likely in the UK or Europe either by an installation vessel or transport barge. Installation vessels are typically JUVs or Dynamic Positioning (DP) vessels to ensure a stable platform for installation vessels when on site. A JUV would also use DP for positioning but would deploy legs during installation. Generally, blades, nacelles and towers for a number of WTGs are loaded separately onto the vessel;
- Typically, as much pre-assembly is completed as can be carried out ahead of transit to site, to ease the installation process. The components will then transit to the wind farm array area and will be lifted onto the pre-installed foundation or transition piece by the crane on the installation vessel. Each WTG will be assembled at site in this way with technicians fastening components together as they are lifted into place. The exact methodology for the assembly is dependent on WTG type and installation contractor and will be defined in the pre-construction phase post-consent;
- Alternatively, the WTG components may be loaded onto barges or dedicated transport vessels at port and installed as above by an installation vessel that remains on site throughout the installation campaign.

94 For the EIA process, assumptions are made on the maximum number of vessels, and the number of return trips to and from site required for the WTG installation campaign (see Section 1.7.1).

WTG Layouts

95 Designing and optimising the layout of WTGs and other offshore surface infrastructure is a complex, iterative process taking into account a large number of inputs and constraints, including:

- Site conditions:
  - Wind speed and direction;
  - Water depth;
  - Ground conditions;
  - Environmental constraints (anthropogenic and natural); and
  - Seabed obstructions (wrecks, UXO, existing infrastructure).
- Design considerations:

- WTG model;
- WTG wake losses;
- Regulatory requirements;
- Installation set-up;
- Foundation design;
- Electrical design; and
- O&M requirements.

96 The AyM layout will have spacing between adjacent turbines no less than 830 m. The final layout may use dense borders (perimeter weighed where more turbines are installed per km^2 than in the centre of the array area) but will not breach the minimum spacing distance. In order to inform the EIA process, the Applicant has identified MDS layouts on a topic-specific basis where required (for example for Seascape, Landscape and Visual Impact Assessment (SLVIA)). Further information on the guiding principles governing the wind farm layout is provided within Volume 4, Annex 9.1: Navigation Risk Assessment.

97 It is very important to note that these layouts are indicative for the purposes of assessment and do not represent the final layout design, which will be influenced by the bullets above. The final positions of WTGs could be located anywhere within the consented array boundary (Figure 1) and will be confirmed post-consent in the detailed design phase.

1.8.7 OSPs

98 OSPs are offshore structures housing electrical equipment to provide a range of functions, such as changing the voltage (transformer), current type (converter) or power factor (booster). In addition to the electrical equipment, the OSPs may contain ancillary items such as cranes, vessel access facilities, a helideck, energy storage, storage for water/waste/fuel/equipment, welfare facilities, and may contain vessel charging facilities. The OSPs at AyM will be the transformer type to step-up the voltage for transmission to shore.

99 The exact locations of OSPs will be determined during the detailed design phase post-consent, taking account of ground conditions and the most efficient cable routeing design. The OSPs would not be permanently manned but once functional would be subject to periodic O&M visits by staff via boat or helicopter.

100 The OSP topside unit is prefabricated in the form of a multi-level structure that is lowered and mounted on a foundation. The foundation options for OSPs are described in Sections 1.8.3, 1.8.4 and 1.8.5. Like WTGs, the OSPs may have diesel generators for commissioning and O&M activities such as crane operation, lighting and ventilation.

101 OSPs are generally installed in two phases, the first phase will be to install the foundation for the structure using an installation vessel as described in Sections 1.8.1 to 1.8.5. Secondly, an installation vessel (same or different from the one installing the foundation) will be used to lift the topside from a transport barge/ vessel onto the pre-installed foundation structure. The design envelope for the OSP is described in Table 18. The vessel requirements for this process are also described in Section 1.7.1.

102 An example of an OSP is illustrated in Figure 10 and the design envelope for OSPs is described in Table 18.

Figure 10: Example of an OSP.

Table 18: Design envelope for OSPs.

PARAMETER	DESIGN ENVELOPE
Number of OSPs	2
Topside dimension	Plan area: 4,000 m^2 Maximum length: 80 m
Topside height above LAT (excluding stowed crane, helideck and mast) (m)	65
Topside height above LAT (including stowed crane, helideck and mast)	85
Maximum unstowed crane height above LAT (m)	115

PARAMETER	DESIGN ENVELOPE
Maximum HVAC system voltage (primary) (kV)	400
Maximum HVAC system voltage (secondary) (kV)	132

1.8.8 Meteorological mast

103 Offshore meteorological masts (met masts) are used to collect data on meteorological variables such as wind speed, wind direction and air temperature. This data is then used to refine the design parameters post-consent and optimise performance during operation.

104 The met mast may be located within the 'other offshore wind farm infrastructure' zone (Figure 1), to the west of the array area, or within the array area itself. The met mast unit may be prefabricated in the form of a tower and will be mounted on a monopile foundation (see paragraph 62 *et seq.*).

105 The maximum height of the met mast will be aligned with the maximum hub height of the WTGs. The met mast will typically feature anemometers, wind vanes and other meteorological equipment at a minimum of three different measurement heights. Similar to WTGs and OSPs, met masts are typically installed in two phases: foundation and mast topside.

106 Alternatively, floating LiDAR buoys may be deployed, which are considered to be within the overall design envelope identified for the met mast. The maximum design parameters for floating LiDAR buoys are described within Table 19 below.

Table 19: Design envelope for floating LiDAR.

PARAMETER	DESIGN ENVELOPE
Maximum number of LiDAR buoys	3
Total seabed area affected (m^2)	18

1.8.9 Permanent vessel moorings

107 PVMs usually consist of a steel or plastic floating buoy, secured to the seabed via one of several solutions including anchor or gravity-based techniques. Driven or drilled pile solutions are not considered for PVMs. The buoy includes mooring loops, shackles or hooks to provide a suitable and secure mooring point for wind farm vessels throughout the operational lifetime of the wind farm. The PVM buoy may be connected via subsea electrical cables (included in the design envelope for array cables in paragraph 110 *et seq.*) to a WTG or OSP and may be used for electric vessel charging.

108 The design envelope for PVMs is described in Table 20.

Table 20: Design envelope for PVMs.

PARAMETER	DESIGN ENVELOPE
Number of PVMs	3
Buoy diameter (m)	6
Total area of seabed disturbed by anchor installation (m^2)	10,080

1.8.10 Subsea cables

109 Cables are required to carry the electrical current generated by the WTGs to the onshore substation and National Grid connection via export cables.

Array cables

110 Cables carrying the electrical current generated by WTGs will link WTGs, PVMs and the met mast together and to an OSP (if OSPs are required). A small number of turbines are typically grouped together on a cable 'string' that connects those turbines to an OSP and the wind farm array will contain several of these strings.

111 The array cables will consist of a number of conductor cores, usually made from copper or aluminium. These will be surrounded by layers of insulating material as well as material to armour the cable from external damage and to keep the cable watertight.

112 Preparatory works will be carried out prior to cable installation (see Section 1.6). The cables will be buried below the seabed wherever possible, with a target burial depth defined post-consent in a Cable Burial Risk Assessment (CBRA) taking account of the ground conditions and other factors.

113 Possible installation methods for array cables include:

- Simultaneous lay and burial via ploughing, cutting or jetting;
- Post-lay burial via cutting, jetting, ploughing, MFE or dredging (TSHD, backhoe dredging or water injection dredging); and
- Installation following pre-installation ploughing, cutting or trenching.

114 It is also possible that ducts are laid and cables subsequently installed.

115 The design envelope for array cables is described in Table 21.

Table 21: Design envelope for array cables.

PARAMETER	DESIGN ENVELOPE
Cable parameters	
Maximum system voltage (kV)	132
External cable diameter (mm)	280
Total length of array cables (km)	124 (of which 116 will be installed on the seabed)
Seabed preparation	
Indicative length of array cable route requiring sandwave clearance (%)	69 (80km)

PARAMETER	DESIGN ENVELOPE
Indicative width of sandwave clearance disturbance corridor (m)	70
Indicative depth of sandwave clearance dredging (m)	5
Total area of seabed disturbed by sandwave clearance (m^2)	5,600,000
Total volume of sediment disturbed by sandwave clearance (m^3)	28,000,000
Maximum volume of material cleared from sandwaves requiring disposal (m^3)	7,600,000
Length of array cable route requiring boulder clearance (%)	100
Width of boulder clearance tool (m)	24
Total area of seabed disturbed by boulder clearance (m^2)	2,786,000
Cable installation	
Maximum burial depth (m)	4
Minimum burial depth (m)	0 (see cable protection requirements in paragraph 123 *et seq.*)
Maximum trench width (m)	6
Maximum installation tool seabed disturbance width (jetting) (m)	18
Total area of seabed disturbed by cable installation (m^2)	2,089,854

PARAMETER	DESIGN ENVELOPE
Total volume of sediment disturbed by cable installation (assuming a V-shaped trench in which 50% of sediment is fluidized and the remaining 50% re-suspended in the water column) (m^3)	2,089,854

Offshore export cables

116 Offshore export cables will be required to transmit the electricity generated by the WTGs to shore. Cables may connect via the OSPs (if required, or be connected directly to a string of WTGs.

117 The offshore export cables are typically larger in diameter than the array cables as they contain larger cores to transmit greater power. Like the array cables, the offshore export cables will consist of a number of cores, usually made from copper or aluminium, surrounded by layers of insulation material and armour to protect the cable from external damage.

118 Preparatory works, including sandwave clearance (Section 1.6) will be carried out prior to cable installation. As with the array cables, it is the preference to bury the cables subject to a CBRA. Installation will likely take place via one or a combination of methodologies described above in paragraph 113. The design envelope for the offshore export cables is described in Table 22. It is also possible that ducts are laid and cables subsequently installed.

119 The seabed may require preparation in the areas where the export cable installation vessel is likely to rest on the seabed, for instance in shallow waters closer to shore. This would include the levelling of seabed features and the removal of boulders. Each circuit would require up to 4 laydown areas (hence 8 total) as described in Table 22 below.

GyM interlink cable

120 A single interlink cable may be installed to connect one of the AyM WTGs or an AyM OSP to the western GyM OSP, to be installed within the AyM array and the GyM interlink zone identified in Figure 1. The parameters of the cable would be within the parameters identified below in Table 22.

121 The cable will be bi-directional and will be held in open standby as a contingency measure should the AyM export cables go offline. In this event, the cable will be able to continue to export a limited proportion of power via the GyM transmission network (only if the GyM transmission network has spare capacity during times of low generation). Additionally, when the interlink is in operation, power from GyM can be exported to AyM to provide safety and integrity functions to the AyM WTGs. However, it should be noted that the existing GyM transmission network is not sufficient to allow full export from AyM and is therefore a short-term contingency measure only, hence the requirement for a new export system bespoke to AyM.

122 Where the interlink cable approaches the GyM OSP, existing rock protection will need to be manipulated to enable the cable to be safely installed. This will involve manipulating a maximum of 100 m^3 of existing rock protection around the GyM OSP using divers, Remotely Operated Vehicle (ROV) or a remote arm from a surface vessel.

Table 22: Design envelope for offshore export cables.

PARAMETER	DESIGN ENVELOPE
Cable parameters	
Maximum system voltage (kV)	400
External cable diameter (mm)	310
Number of export cable circuits	2
Total length of export cables (km)	79.4 (including up to 10 km for the GyM interlink cable)

PARAMETER	DESIGN ENVELOPE
Seabed preparation	
Indicative length of export cable route requiring sandwave clearance (km)	63
Indicative width of sandwave clearance disturbance corridor (m)	70
Indicative depth of sandwave clearance dredging (m)	5
Total area of seabed disturbed by sandwave clearance (m^2)	4,440,000
Total volume of sediment disturbed by sandwave clearance (m^3)	22,000,000
Maximum volume of material cleared from sandwaves requiring disposal (m^3)	6,281,000
Length of export cable route requiring boulder clearance (%)	100
Width of boulder clearance tool (m)	24
Total area of seabed disturbed by boulder clearance (m^2)	1,906,000
Maximum area of seabed disturbed by export cable installation vessel laydown areas (m^2)	57,600
Maximum volume of sediment disturbed by export cable installation vessel laydown areas (m^3)	57,600
Cable installation	

PARAMETER	DESIGN ENVELOPE
Indicative maximum burial depth (m)	4
Minimum burial depth (m)	0 (see cable protection requirements in Section 123 *et seq.*)
Maximum trench width (m)	6
Maximum installation tool seabed disturbance width (jetting) (m)	18
Total area of seabed disturbed by cable installation (m^2)	1,430,000
Total volume of sediment disturbed by cable installation (assuming a V-shaped trench in which 50% of sediment is fluidized and the remaining 50% re-suspended in the water column) (m^3)	1,429,560

Cable protection

123 In some cases, where burial cannot be applied, or where the minimum cable burial depth cannot be achieved, it is necessary to use alternative methods such as rock placement, concrete mattresses or other solutions such as Cable Protection Systems (CPS), flow dissipation devices, bagged solutions or protective aprons to protect the cable from external damage. It should be stressed that cable burial is the preferred method of installation, and additional cable protection will only be used as a contingency where cable burial is not appropriate or achievable.

Rock placement

124 Rocks of different grades or sizes are placed, via a fall pipe vessel, over the cable. Typically, smaller rocks are placed over the cable as a covering layer, topped with an armouring layer of larger rocks. The rock grading has a mean rock size of 90-125 mm, up to a maximum of 250 mm. Rock protection generally forms a trapezium shape over the cable, with a slope either side, designed to provide protection from both direct anchor strikes and anchor dragging.

Concrete mattresses

125 Concrete mattresses are formed by interweaving a number of small concrete blocks with rope and wire to provide a flexible protective mattress. They are lowered to the seabed on a frame and, once positioning is confirmed, released over the length of cable requiring protection. Mattresses provide protection from direct anchor strikes but rock protection provides better protection from anchor drag.

Flow dissipation devices

126 Flow dissipation devices such as frond mattresses, are suitable for use in soft, mobile sediment environments. They consist of a mattress of buoyant fronds that create a drag barrier that significantly reduces current velocity within the fronds, acting to entrain sediments to build a protective layer out of naturally occurring suspended sediments that pass over the cable. Flow dissipation devices are designed to form protective, localised sand berms and are suited to addressing cable trench stability and scour related issues. To protect cables, the flow dissipation device can be either fixed to the cable or laid over it in the form of a mattress.

Rock bags

127 Rock bags consist of various sized rocks constrained within a wire or rope net. Alternatively, geotextile bags can be used, filled with sand. They can be placed by a crane to ensure placement in the exact required location. Similar to flow dissipation devices, rock bags are more suited for addressing cable trench stability and scour related issues.

Design envelope for cable protection

128 The design envelope for cable protection is described in Table 23.

Table 23: Design envelope for cable protection.

PARAMETER	DESIGN ENVELOPE	
	ARRAY CABLES	EXPORT CABLES
Length of cable requiring cable protection (including cable ends protection) (%)	20 (32 km)	20 (16 km)
Width of cable protection on seabed (m)	6	15.2
Height of cable protection berm (m)	1	1.4
Total area of seabed covered by cable protection (m^2)	192,124	242,853
Total volume of cable protection required (m^3)	112,072	218,741

Cable crossings

129 It is necessary to cross existing cables in the area to achieve connection from the array to the landfall. Cable crossings are subject to crossing agreements post-consent with the owners of those existing assets, and are necessary to provide protection to both assets, and to ensure a minimum separation so that cables do not overheat.

130 Cable crossings usually consist of a layer of protection over the existing asset (the separation layer) over which the AyM cables would be installed. A secondary layer would then be installed over the AyM cable for protection. Cable crossings may utilise rock protection or concrete mattresses (as described in paragraphs 123 to 128) or bridging typically of steel or concrete construction.

131 The design envelope for cable crossings is described in Table 24. Cable crossings will only be required for the offshore export cables, not the array cables. One cable crossing will be required within the GyM interlink zone for the interlink cable to cross a single GyM array cable. The total number of cable crossings required is 15, however, the design envelope includes a contingency for up to 19 should future developments need to be crossed. This scenario is not anticipated to occur, but the design envelope includes sufficient contingency should this be necessary.

Table 24: Design envelope for cable crossings.

PARAMETER	DESIGN ENVELOPE
Number of offshore export cables	2 (+1 interlink cable to GyM)
Number of crossings per export cable circuit	7
Cables to be crossed	Eirgrid (1 x HVDC pair) GyM (4 x HVAC) North Hoyle (2 x HVAC) GyM array cable (in the GyM interlink zone)
Total number of crossings required	15 (up to 19 including contingency)
Indicative length of crossings (m)	Eirgrid: 300 GyM: 500 (likely managed as a single crossing) North Hoyle: 325 (managed as a single crossing) GyM array cable in GyM interlink zone: 300
Total length of cable crossings (m)	2,550
Width of crossing (m)	15.2

PARAMETER	DESIGN ENVELOPE
Height of rock berm (m)	1.4
Cross sectional area of trapezoid (m^2)	13.7
Total area of seabed covered by cable crossings (m^2)	39,500
Total volume of cable protection required (m^3)	35,700

Cable jointing

132 Cable installation vessels are limited in the length of cable they can transport and install in a single loadout. Where lengths of offshore cable must be jointed to one another, it is not possible to bury the joint using conventional cable burial tools such as ploughs. Therefore, it may be necessary to excavate a pit to accommodate the joint, which is then backfilled to ensure the joint's protection. If it is not practical to bury the joint, then it may be covered with remedial cable protection. Given the short length of the AyM offshore ECC, it may be possible to install each export cable in a single length, however, it is assumed that each cable circuit will require up to one joint each. Each export cable circuit will require up to one joint, giving a maximum requirement of two cable joints for the offshore export cables. It is assumed that the seabed footprint for cable jointing is within the design envelope for seabed preparation and cable installation described in Table 22.

1.8.11 Aids to navigation, colour, lighting and marking

133 The wind farm will be designed and constructed to satisfy the requirements of the CAA, Maritime and Coastguard Agency (MCA) and Trinity House Lighthouse Service (THLS) in respect of aids to navigation, lighting and marking. Table 25 below describes the aviation and navigation lighting requirements for AyM structures.

134 All fixed bottom structures will have low level lighting directed onto Identification (ID) marker boards.

135 Further information on aids to navigation, marking and lighting can be found in Volume 2: Chapter 9: Shipping and Navigation (application ref: 6.2.9) and Volume 2, Chapter 13: Aviation and Radar (application ref: 6.2.13). Post-consent, lighting and marking will be specifically developed within a Lighting and Marking Strategy.

136 The colour scheme for the blades, nacelles and towers is generally light grey, whilst foundation steelwork is generally traffic light yellow from Highest Astronomical Tide (HAT) up to the aids to navigation or a height as directed by THLS. Automatic Identification System (AIS) and infrared beacons may be considered if appropriate.

Table 25: Design envelope for lighting requirements.

PARAMETER	DESIGN ENVELOPE		
	WTGS	OSP	MET MAST
Aviation lighting intensity (cd)	2000 (Dimmable to 200 when visibility is >5 km at night)	N/A	2000 (Dimmable to 200 when visibility is >5 km at night)
Navigation lighting (nominal range (nm))	Significant Peripheral Structure (SPS): 5 Intermediate Peripheral Structure (IPS): 2	N/A	10
Heli-hoist lighting	Low intensity green light (200 cd) at the heli-hoist platform. Lighting will only be activated when a structure is being prepared for helicopter approach.		N/A

PARAMETER	DESIGN ENVELOPE		
	WTGS	OSP	MET MAST
ID marker board lighting	Typically low level baffled (5 – 10 cd/m^2) lighting directed towards the ID marker board. Located on the foundation body or Main Access Platform (MAP).		
Workplace lighting	Illumination levels for external areas will typically be 50 lux located at the foundation level of structures, providing illumination for the access ladder, resting platforms and MAP. Workplace lighting will only be infrequently activated during the O&M phase when a structure is manned for maintenance activities.		

1.8.12 Safety zones

137 During construction and decommissioning, it is assumed for the purposes of assessment that the Applicant will apply for 500 m safety zones around infrastructure that is under construction. Temporary safety zones of 50 m will be sought for incomplete structures such as installed monopiles without transition pieces, or where construction works are completed but commissioning has yet to be completed.

138 During the O&M phase, the applicant may apply for temporary 500 m safety zones around infrastructure that is undergoing major maintenance (for example a WTG blade replacement).

139 Outside of construction, decommissioning and major maintenance works, the applicant does not intend to apply for permanent safety zones around operational infrastructure.

1.9 Landfall

Overview

140 The landfall denotes the location where the offshore export cables are brought ashore and jointed to the onshore export cables in TJBs. There is a clear overlap in the offshore and onshore study area at the intertidal area of the landfall and therefore this Section provides a brief description of what may be considered 'onshore' works for completeness. Full details of the onshore project description are provided in Volume 3, Chapter 1: Onshore Project Description (application ref: 6.3.1).

141 The offshore export cables will make landfall east of Rhyl, north of Rhyl Golf Club (Figure 1). The works at the landfall include:

- Construction of the landfall compound;
- Horizontal Directional Drilling (HDD) works (or other suitable alternative trenchless techniques such as micro-boring) including temporary construction of HDD exit pits in the intertidal or shallow subtidal, with these exit pits potentially requiring the construction of cofferdams;
- Intertidal trenching;
- Construction of TJBs;
- Installation of offshore export cables (cable pulling);
- Installation of and jointing to onshore export cables;
- Backfilling and re-instatement works.

142 The offshore export cables are connected to the onshore export cables in TJBs, located onshore, south of the North Coast railway line. TJBs are pits in which the jointing between offshore and onshore export cables takes place, with one TJB required per cable circuit. They are constructed to ensure that the jointing can take place in a clean, dry environment, protecting the joints once completed. Once the joint is completed the TJBs are covered and the land above reinstated. The Applicant has committed to no above-ground works within Rhyl Golf Club – instead, cables will be installed underneath the club via HDD (or other trenchless technique) with no requirement for intrusive works. TJBs will not require any planned access during the O&M phase, however, smaller link boxes that do require access via manholes may be necessary.

143 The techniques used to carry out the landfall works at the intertidal area broadly fall into two categories: trenchless techniques (such as HDD, micro-tunnelling or auger boring), and open-cut installation (such as trenching). It may be possible to carry out trenchless techniques beyond the intertidal area and install the rest of the cable using an offshore installation spread. Jack-up barges may be required in the shallow subtidal, the footprints of which are within the overall footprint of disturbance within the cable corridor. The technical feasibility of this approach will require confirmation via intrusive geophysical and geotechnical survey. However, it may also be the case that this is not possible or preferred (due to ground conditions, cable design, or other factors), in which case open cut techniques would be required; or a combination of these two methodologies. It should be noted that open cut installation has been excluded for installation through the sea wall, such that the project will not interfere with either existing or planned sea defence works in the area.

144 The offshore cables will be brought ashore to connect to the onshore export cables within the TJB compound onshore south of the North Coast railway line. The design envelope for the TJB works is described in Table 26, with the trenchless and open-cut options for cable installation used to bring the offshore cables ashore described in the subsequent paragraphs.

Table 26: Design envelope for the TJB.

PARAMETER	DESIGN ENVELOPE
Number of export cable circuits	2
Number of TJBs	2
TJB dimensions (m)	20 x 5
Land take for TJBs Temporary Construction Compound (TCC) during construction (m^2)	20,000
Permanent land take for TJBs during O&M (m^2)	1,200

Trenchless techniques

145 HDD is the established solution for trenchless installation, however it should be noted that other technologies exist, such as micro-boring. HDD involves drilling a long borehole underground using a drilling rig located within a compound. This technique avoids interaction with surface features and is used to install ducts through which cables can be pulled.

146 As the drill is carried out between a start and end point, entry and exit pits must be excavated at either end of the borehole: one in the landfall compound and one on the offshore side. HDDs can vary in length depending on the ground conditions but can typically achieve up to 1,500 m in length.

147 The process uses a drilling head controlled from the rig to drill a pilot hole along a predetermined profile to the exit point. The pilot hole is then widened using larger drilling heads until the hole is wide enough to accommodate the cable ducts. Drilling fluid (typically containing bentonite) is pumped to the drilling head to stabilise the borehole, recover drill cuttings and ensure the borehole does not collapse.

148 The HDD (or other trenchless technique) exit pits may be located within the intertidal zone or the shallow subtidal. Exit pits will be excavated or dredged to the required depth, and side-cast material for backfilling will be stored adjacent to the exit pit. Depending on the final methodology and location, it may be required to install cofferdams temporarily to reduce water intrusion. Cofferdams consist of sheets of metal and may be installed by vibropiling or impact piling.

149 Once the drilling operation has taken place, the ducts are pulled through the drilled holes. The ducts are either jointed off-site, then sealed and floated to site by tugs, or will be jointed locally and pulled over the beach on rollers. The ducts are then pulled back through the boreholes either by the HDD rig itself, or by separate winches.

150 Once the ducts are in place, the exit pits will likely be temporarily backfilled until ready for cable pull-through. The ducts will then need to be re-exposed to pull in the cable. Once installation is complete, the exit pits will be backfilled using available side-cast material and the remainder left to naturally backfill.

151 Wherever possible, beach access will be maintained, however where open-cut works are necessary (for example in the case of an intertidal exit pit), parts of the beach may need to be temporarily closed to the public. The design envelope for trenchless techniques is described in Table 27.

Table 27: Design envelope for trenchless techniques.

PARAMETER	DESIGN ENVELOPE
Number of cable circuits	2
Number of cable ducts	3 (one per circuit plus one contingency)
Exit pit location	Intertidal or shallow subtidal, between MHWS and 1,000 m seaward of MHWS
Number of exit pits required	3
Exit pit dimensions (m)	10 x 75

PARAMETER	DESIGN ENVELOPE
Exit pit depth (m)	2.5
Total volume of sediment excavated from exit pit (m^3)	5,625
Hammer energy for cofferdam sheet piling (kJ)	300
Volume of drilling fluid that could be released from HDD (m^3)	18,117

Open-cut installation

152 Open-cut installation could be carried out using one or more methods described for the offshore export cables in Section 116 *et seq.* (with the exception of dredging and MFE, noting that a backhoe may also be used in the intertidal). In the event that the HDD exit pits are located in the intertidal zone, open-cut installation will be required seaward of that location. As with offshore export cable installation, cables may be installed via simultaneous lay and burial, or a trench may be opened and the cable subsequently installed within, after it has been pulled across the beach. Cable installation tools are usually pulled across the beach on skids or tracks.

153 The design envelope for open-cut installation is included within the design envelope for the offshore export cables described in Table 22. Cable protection requirements are similarly included within the envelope for the offshore export cables described within Table 23. However, if required in the intertidal, cable protection will be buried and will not consist of loose rock or gravel. In the shallow subtidal (out to 1,600 m seaward of MHWS), cable protection will similarly not consist of loose rock or gravel.

1.10 Operations and maintenance

154 The indicative project programme states that the project will be fully constructed and operational by 2030, and the operational lifetime of the project is anticipated to be approximately 25 years. The overall O&M strategy will be finalised once the technical specification is known, including WTG model and final project layout.

155 Maintenance activities fall into two categories: preventative and corrective. Preventative maintenance is carried out according to regular scheduled services, whereas corrective maintenance covers unexpected repairs, component replacement, retrofit campaigns and breakdowns. In recent years, the offshore wind industry has developed a better understanding of preventative maintenance for operational wind farms. For cables in particular, AyM will be designed to require no routine cable maintenance or re-burial as these events are disruptive and costly, however, the option is retained for flexibility in the event of unforeseen circumstances. Options for cable maintenance work include cable re-burial via jetting, or placement of cable protection. The design envelope for these O&M works is described in Table 28.

Table 28: Design envelope for O&M activities.

PARAMETER	DESIGN ENVELOPE	
	LARGER WTGS	SMALLER WTGS
O&M strategy		
Project lifetime (years)	25	25
Surface infrastructure (WTGs, OSPs and met mast)		
Number of major component replacements requiring JUVs over project lifetime	135	180
Maximum seabed disturbance from JUV footprints (m^2) per year	5,940	7,920

PARAMETER	DESIGN ENVELOPE	
	LARGER WTGS	SMALLER WTGS
Array cables		
Length of cable requiring remedial works (km)	5	5
Number of array cable repairs over project lifetime	5	5
Seabed disturbance per array cable repair event (m^2)	6,000	6,000
Total seabed disturbance for array cables over project lifetime (m^2)	30,000	30,000
Offshore export cables		
Length of cable requiring remedial works (km)	5	5
Number of offshore export cable repairs over project lifetime	4	4
Seabed disturbance per offshore export cable repair event (m^2)	6,000	6,000
Total seabed disturbance for offshore export cables over project lifetime (m^2)	24,000	24,000

156 The general operation and maintenance strategy may rely on an onshore (harbour based) operation and maintenance base, CTVs, Service Operation Vessels (SOVs), offshore accommodation vessels, supply vessels, cable and remedial protection vessels and helicopters for the operation and maintenance services that will be performed at AyM. The final operational and maintenance strategy chosen may be a combination of the above solutions.

157 The design envelope for the operation and maintenance vessels are presented in Table 29. Helicopters are also considered for crew transfer during unplanned maintenance via heli-hoist winching directly onto WTGs and landing on OSP helidecks. Up to 120 or 200 helicopter return trips per year may be required in the larger and smaller WTG scenarios, respectively.

Table 29: O&M vessel requirements.

VESSELS	DESIGN ENVELOPE	
	PEAK VESSELS	ANNUAL ROUND TRIPS
JUVs	2	6
SOVs	2	52
CTVs	6	1,095
Lift vessels	2	6
Cable maintenance	2	1
Auxiliary vessels	8	48

1.11 Decommissioning

158 For the purposes of the MDS for EIA, at the end of the operational lifetime of AyM, it is assumed that all infrastructure will be completely removed. The decommissioning sequence will generally be in the reverse of construction (reverse lay) and is expected to involve similar types and numbers of vessels and equipment and take place over a three-year period.

159 Closer to the time of decommissioning, it may be decided that removal would lead to a greater environmental impact than leaving some components *in situ*, in which case certain components may be cut off at or below seabed level (e.g. in the case of piled foundations) or left *in situ* (e.g. in the case of subsea cables and rock protection).

160 A decommissioning plan will be required to be submitted pre-construction, conditional as part of the suite of post-consent documentation for AyM. Under Section 105 of the Energy Act 2004, a decommissioning programme is required to be submitted to the SoS prior to commencement of construction.

1.12 References

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Category 6: Environmental Statement

Non-Technical Summary

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Glossary of terms

TERM	DEFINITION
Array area	The offshore area where the Wind Turbine Generators (WTGs) will be located.
Design envelope	A description of the range of possible elements that make up the Awel y Môr Offshore Wind Farm (AyM OWF) design options under consideration. The envelope is used to define Awel y Môr Offshore Wind Farm (AyM) for Environmental Impact Assessment (EIA) purposes when the exact final engineering parameters are not yet known. This is often referred to as the 'Rochdale Envelope' approach.
Development Consent Order (DCO)	An Order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating the magnitude of an impact with the importance or sensitivity of a receptor in accordance with defined criteria.

TERM	DEFINITION
Environmental Impact Assessment (EIA)	A process by which certain planned projects must be assessed before a decision to proceed can be made. It involves the collection and consideration of environmental information which fulfills the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Horizontal Directional Drilling (HDD)	Method for the installation of cables underground using a drilling rig. HDD is an established example of a trenchless cabling installation technique.
Impact	The change upon a receptor that is caused, either directly or indirectly, by an action resulting from the construction, Operation and Maintenance (O&M) or decommissioning of the project being assessed.
Magnitude	The degree of change on the receiving environment determined by considering the extent, duration, frequency and reversibility of an impact.
Marine licence	A licence under the Marine and Coastal Access Act (MCAA) 2009 for certain works in the marine environment.
National Policy Statement (NPS)	A series of documents setting out national (UK) policy against which proposals for NSIPs are assessed and decided upon.
Nationally Significant Infrastructure Project (NSIP)	Large scale development (including offshore wind farms in Welsh waters with a generating capacity of over 350 Megawatts (MW)) which requires a DCO under the Planning Act 2008.
(Onshore and offshore) Export Cable Corridor (ECC)	The corridor within which the export cables will be located, allowing connection of the wind farm array offshore to the National Grid network onshore.

TERM	DEFINITION
Receptor	A component of the physical, biological or human environment that is affected by an impact.
Sensitivity	The extent to which a receptor can accept an impact based on consideration of its value, importance, vulnerability and recoverability.
Significance	The significance of an effect combines the magnitude of an impact with the sensitivity of the receptor being affected.
Statement of Community Consultation (SoCC)	A document explaining how consultation is planned to be conducted with the local community.

Abbreviations and acronyms

TERM	DEFINITION
AEZ	Archaeological Exclusion Zone
AONB	Area of Outstanding Natural Beauty
AQO	Air Quality Objective
AyM	Awel y Môr Offshore Wind Farm
AyMOWFL	Awel y Môr Offshore Wind Farm Limited
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
CoCP	Code of Construction Practice
DCO	Development Consent Order
ECC	Export Cable Corridor

TERM	DEFINITION
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Field
ES	Environmental Statement
ETG	Expert Topic Group
GVA	Gross Value Added
GyM	Gwynt y Môr Offshore Wind Farm
HDD	Horizontal Directional Drill
HRA	Habitats Regulations Assessment
INNS	Invasive and Non-Native Species
LVIA	Landscape and Visual Impact Assessment
MCAA	Marine and Coastal Access Act
MHWS	Mean High-Water Springs
MLWS	Mean Low-Water Springs
NGET	National Grid Electricity Transmission
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
OLEMP	Outline Landscape and Ecological Management Plan
O&M	Operation and Maintenance

TERM	DEFINITION
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
PINS	The Planning Inspectorate
PPEIRP	Project Pollution and Emergency Incident Response Plan
PRoW	Public Right of Way
RD	Rotor Diameter
RSPB	Royal Society for the Protection of Birds
SABP	St. Asaph Business Park
SAR	Search and Rescue
SLVIA	Seascape, Landscape and Visual Impact Assessment
SoS	Secretary of State
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
SUDS	Sustainable Urban Drainage Systems
TCC	Temporary Construction Compound
TCE	The Crown Estate
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
WTG	Wind Turbine Generator

Units

UNIT	DEFINITION
km	Kilometre
km^2	Square kilometre
kv	Kilovolt
m	Metre
mg/l	Milligram per litre
MW	Megawatt
nm	Nautical mile
%	Percent

Non-Technical Summary

1 Introduction

1.1 The Non-Technical Summary

1 This document is a Non-Technical Summary (NTS) of the Environmental Statement (ES) for the Awel y Môr Offshore Wind Farm (hereafter referred to as AyM). The NTS provides summary details of AyM, as well as a description of the existing environment in and around the development area. The NTS also presents a summary of the key findings of the Environmental Impact Assessment (EIA) undertaken for AyM.

2 Mae cyfieithiad Saesneg o'r Crynodeb Annhechnegol yma ar gael drwy wefan y prosiect ([redacted]).

3 The ES sets out the findings of the EIA to support the Development Consent Order (DCO) and marine licence applications. The focus of the EIA is on the assessment of the environmental impacts which are likely to have significant effects on the environment. The NTS is intended to act as a standalone document providing an overview of the environmental effects of the proposed development using non-technical language. For more detailed information, the full ES should be referred to, which will be published on the project page of the Planning Inspectorate's website.

1.2 Introduction to the Awel y Môr offshore wind farm

4 AyM is a proposed sister project to the operational Gwynt y Môr Offshore Wind Farm (hereafter referred to as GyM) off the coast of North Wales (Figure 1). GyM has been operational since 2015 and has invested £90m in Wales during construction, and has since created more than 100 long-term, skilled jobs at the Port of Mostyn.

5 In February 2017, The Crown Estate (TCE) announced the opportunity for developers to apply for project extensions to operating offshore wind farms. Eight applications were received, including AyM, which met the specified criteria. In August 2019, TCE published a plan-level Habitats Regulations Assessment (HRA) which assessed the potential impacts of the proposed projects on relevant nature conservation sites of the National Site Network. Seven of the eight extension projects, including AyM, proceeded to the award of leasing rights as part of the 2017 extensions round. The Agreement for Lease for AyM was awarded in Summer 2019.

6 AyM will comprise an array of offshore Wind Turbine Generators (WTGs) in Welsh waters with an overall capacity greater than 350 Megawatts (MW) and therefore constitutes a Nationally Significant Infrastructure Project (NSIP) under Section 15(3B) of the Planning Act 2008. Such projects require a DCO to be granted by the relevant UK Secretary of State (SoS); in this case, the SoS for Business, Energy and Industrial Strategy (BEIS). Marine planning is a matter which is devolved to the Welsh Government, and therefore a marine licence is also required under the Marine and Coastal Access Act 2009. The Applicant is seeking these consents through parallel applications to the SoS for BEIS and Welsh Government, respectively.

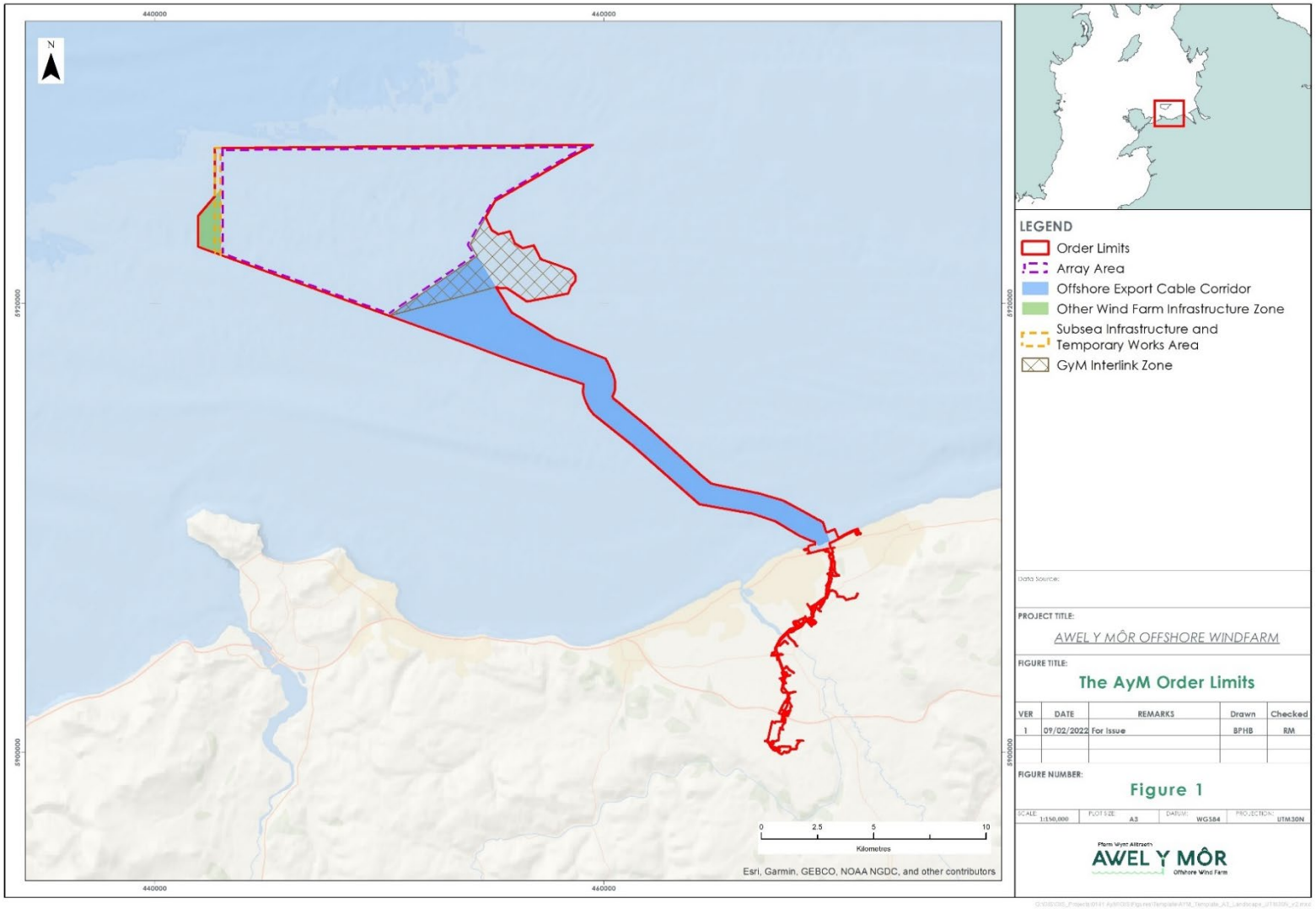

Figure 1: The AyM Order Limits.

1.3 Purpose of the Environmental Statement

7 The ES sets out the findings of the EIA to support the DCO and marine licence applications. The ES has been informed by, and its scope is based upon, a Scoping Opinion received from the Planning Inspectorate (PINS). It also builds on, and updates information provided in the Preliminary Environmental Information Report (PEIR). Feedback from the PEIR consultation has been considered and has informed both the final design of AyM as well as the content of this ES. Further details on the requirements of the DCO and marine licence applications are provided in Volume 1, Chapter 2: Policy and Legislation (application ref: 6.1.2).

1.4 About the Applicant

8 The project partners of Awel y Môr Offshore Wind Farm Limited (AyMOWFL) ('the Applicant') are RWE (60%), Stadtwerke München (30%) and Siemens Financial Services (10%). RWE is leading the development of the project on behalf of the project partners.

9 RWE generates one third of all Wales' renewable energy, making it the largest renewable energy operator in Wales. RWE aims to make a significant contribution towards Welsh Government targets to generate 70% of electricity needs from renewable energy sources by 2030 and to reach net-zero carbon emissions by 2050.

10 As a responsible developer, RWE has also looked to upskill the future generation through creation of its Wind Turbine Apprenticeship Programme in partnership with Grŵp Llandrillo, which officially opened in 2012. The course has trained a number of new apprentices producing high quality technicians who are primarily deployed on offshore and onshore wind farms, both locally and across the United Kingdom (UK).

1.5 Consultation

11 It is a statutory requirement for promoters of NSIPs to engage in pre-application consultation with local communities, local authorities, and anyone who may be directly affected by the proposals. AyM produced a Preliminary Environmental Information Report (PEIR) to inform consultees about AyM and the likely significant effects associated with the construction, operation, maintenance and decommissioning phases of the project.

12 The publication of the PEIR represented the start of the formal consultation process required under the Planning Act 2008. The process concluded on 11 October 2021, after which the Applicant was obliged to review feedback and have due regard to it, as the assessments were finalised in the ES . A full description of how feedback has been incorporated into the EIA and DCO and marine licence applications is presented in the Consultation Report (application ref: 5.1).

2 Policy and legislation

13 This section of the NTS summarises the consents framework and key legislation and policies that are relevant to the development of AyM within the EIA process. A full description of relevant policy and legislation is described within Volume 1, Chapter 2: Policy and Legislation of the ES (application ref: 6.1.2).

2.1.1 Climate change and the role of renewable energy

14 UK legislation relating to climate change and renewable energy is underpinned by a number of international agreements. The United Nations Framework Convention on Climate Change (UNFCCC) commits its parties to setting binding targets for reductions in greenhouse gas emissions. The UK is a signatory to the Kyoto Protocol, an international agreement linked to the development and implementation of the UNFCCC, which came into effect in 2005, and was transposed into UK law via the Climate Change Act 2008. A series of regular meetings of the UNFCCC has been held, resulting in several important and binding agreements, including the Copenhagen Accord 2009, the Doha Amendment 2012, and the Paris Agreement 2015.

15 The Climate Change Act 2008 places a duty on the UK Government to ensure its net carbon account and greenhouse gas emissions are reduced by 80%, relative to 1990 levels, by 2050. In 2019, the UK Government increased its target reduction to 100% (net zero carbon emissions).

16 The central objective of UK Government policy is to ensure the security of energy supply, whilst responding to the challenge of climate change by reducing carbon emissions. To meet its objectives, more renewable energy infrastructure is required, with an increased emphasis on generation from renewable and low-carbon sources, including offshore wind. The UK's commitment to renewable energy generation is captured through the publication of the National Policy Statements (NPSs) for Energy, Renewable Energy and Electricity Networks Infrastructure (NPS EN-1, 3 and 5, respectively).

17 In 2019, the Welsh Government declared a climate emergency with the hope of triggering a wave of action to tackle climate change in Wales, and internationally. Several local authorities in North Wales have also declared climate emergencies since. AyM is being developed with the aim of contributing to Welsh Government targets to generate 70% of electricity needs from renewable sources by 2030.

18 UK Government targets for offshore wind have been noted as 40GW by 2030 within the draft National Policy Statements (NPS). A revision has been introduced in the April 2022 UK Government Energy Security Strategy to increase this from 40GW to 50GW by 2030, 45GW of which is targeted to be provided by offshore wind.

2.1.2 Consent framework and the EIA

19 AyM is defined as an NSIP. The Planning Act 2008 sets out a comprehensive statutory framework for the principal consents required to construct, operate and decommission NSIPs, together with associated infrastructure.

20 Permission to build and operate an NSIP is provided through a DCO which, in the case of energy infrastructure, is granted by the SoS for BEIS. Marine planning in Wales is a devolved process, and a separate marine licence is also required from the Welsh Government under the Marine and Coastal Access Act 2009 (MCAA).

21 In support of these processes, applicants are required to undertake an EIA for certain types of development, including offshore wind farms. The legislative framework for EIA was provided by European Directive 2011/92/EU (the 'EIA Directive'), which is transposed into UK law through the Infrastructure Planning (EIA) Regulations 2017 and the Marine Works (EIA) Regulations 2007 (as amended), as relevant to the DCO and marine licensing processes, respectively. In the ES, these are collectively referred to as 'the EIA Regulations'.

3 EIA methodology

22 This section presents an outline of the EIA methodology that has been employed for AyM in the preparation of the ES. The EIA for AyM describes the potential effects on the environment arising from the construction, Operation and Maintenance (O&M), and decommissioning of the project. If significant effects are predicted, it identifies mitigation to reduce the significance of these effects (where practicable). A full description of the EIA methodology used is described within Volume 1, Chapter 3: EIA Methodology (application ref: 6.1.3).

23 The EIA process can broadly be summarised as consisting of three main elements:

- **Scoping:** The Applicant can request a formal Scoping Opinion from the relevant authority, setting out what the EIA should consider in broad terms;
- **Consultation:** The Applicant is required to conduct pre-application consultation (including community consultation) in accordance with the Planning Act 2008 and associated guidance. The PEIR formed the basis of this statutory consultation and was prepared in the format of a draft ES;
- **ES preparation:** The ES is prepared in consideration of the responses received during the formal consultation and is submitted as part of the suite of application documents.

3.1.1 Consultation and scoping

24 Scoping is the process of identifying the issues to be addressed during the EIA process. On 11 June 2020, the Applicant submitted a Scoping Report for AyM to the Planning Inspectorate (PINS). This document specified which environmental assessments would be conducted for the proposed development and provided rationale for assessments that would not be undertaken. In response, AyM received a Scoping Opinion from PINS on behalf of the SoS on 22 July 2020, that highlighted a number of areas that consultees wished to see addressed within the EIA. These responses, together with other consultation responses provided throughout the EIA process, have been taken into account in identifying the scope for the EIA. The scope has also been informed by the nature, size and location of the proposed development.

25 Following scoping, Expert Topic Group (ETG) meetings were held via an Evidence Plan process: a series of regular consultation meetings with key stakeholders on technical matters included within the EIA process.

3.1.2 The PEIR

26 The Applicant produced a PEIR, adopting a draft ES format, that formed the basis of statutory consultation. The PEIR was published on 31 August 2021 and open to feedback from consultees, including the community, for a period of six weeks, until 11 October 2021. The PEIR provided an early assessment of predicted environmental impacts potentially brought about by AyM, using the data available at the time. The PEIR provided sufficient information for consultation with the public, statutory and non-statutory consultees, and provided information on the predicted impacts arising from the construction, O&M and decommissioning of the development and the assessment methodologies to be used within the ES.

27 The potential environmental effects of AyM have been assessed for each relevant topic area (as agreed during the scoping phase), by comparing the baseline environment with the expected conditions that would prevail should the development go ahead. The baseline environment is determined through desk studies and surveys and was agreed through the Scoping Report, the Evidence Plan process, and other formal consultation processes.

3.1.3 Approach to EIA

28 The assessment of each topic forms a separate chapter within the ES, with interlinkages clearly identified, such as the link between fish ecology and fish as a prey resource for marine mammal ecology. Each chapter addresses:

- Policy and statutory context;
- Consultation responses related to that topic to date;
- The scope and methodology of the assessment;
- A description of the relevant existing environment;
- Key parameters for assessment, based on the project design that defines the maximum worst-case scenario, known as the 'Rochdale Envelope' or 'design envelope';
- Identification of embedded mitigation that has already been adopted as part of the project design to date;
- An assessment of potential environmental effects related to that topic;
- Identification of residual impacts (taking into account embedded and further mitigation);
- Identification of cumulative, transboundary and inter-related effects; and
- Identification of any requirements for further mitigation and/ or monitoring to date.

3.1.4 Existing environment

29 The description of the existing environment describes the baseline condition upon which the assessments have been made, forming the foundation of the evidence-based approach. The existing environment of the site and study area form the basis of each assessment, enabling the likely significant effects of the project to be identified. The description of the existing environment draws on site-specific data collected for the purposes of the assessment, as well as information and data from sufficiently similar investigations to inform the understanding of the baseline and/ or impact assessments. As AyM sits adjacent to the existing GyM, extensive data from the EIA, baseline and monitoring for GyM are available which provide both raw data and modelling that are relevant to the assessments for AyM. Where possible, appropriate and agreed with the relevant stakeholders, RWE has used this existing data to aid in the EIA process.

3.1.5 The 'Design Envelope' approach

30 The design envelope is a term used to identify the range of possible options within the project which characterise the maximum parameters, such as the maximum wind turbine blade tip height or longest length of cable that may be developed. In practice, these maximum design parameters act as an envelope which can be assessed, whilst also limiting the developer by defining maximum parameters, replicated in any consent, which cannot be exceeded.

31 Within the maximum extents, the approach gives the developer a certain amount of flexibility to respond to future best practice and changes in technology. Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of submitting the application. PINS guidance recognises that in these circumstances it is appropriate for the maximum design scenario to be assessed.

32 In order to ensure the developer does not exceed the assessed parameters, the parameters used for the assessment need to be clearly defined in the DCO and therefore in the accompanying ES. This provides confidence that the Proposed Development within the DCO (as built) would not result in significant effects beyond those assessed in the ES.

3.1.6 Embedded mitigation

33 The EIA process is an integral and ongoing part of the project appraisal and design process. During the EIA, the likely significant effects have been considered and have been taken into account within the ongoing design process. The EIA has therefore been used as a means of informing and improving the project design. The project assessed within the ES consequently includes a range of measures that have been designed to reduce or prevent significant adverse effects from occurring; these measures are called mitigation.

34 The assessment has taken into account both 'embedded' (or designed-in) mitigation measures and 'applied' mitigation measures.

3.1.7 Assessment of effects

35 The ES sets out an assessment of the likely effects during all phases of the project life cycle (construction, O&M, and decommissioning) based on the likely magnitude of the predicted impacts, and the sensitivity of the receptor(s). The magnitude of impact takes into account its spatial extent, duration, frequency and severity, and can be designated as 'high', 'medium', 'low' or 'negligible'. Impacts are also identified as 'adverse' (negative), or 'beneficial' (positive). The sensitivity of a receptor is also assessed as 'high', 'medium', 'low' or 'negligible'. The assigning of these criteria to impacts and receptors are based on current understanding, expert knowledge and guidance, which are defined and presented within the ES chapters. It is important to note that, where individual assessments differ from the methodology presented here based on industry guidance, these are clearly defined within the relevant chapters.

36 Once the magnitude and sensitivity have been assessed, these are combined in a matrix to give the significance of the effect (Table 1). Effects of 'moderate' or 'major' are deemed to be 'significant' in EIA terms, whereas effects of 'minor' or 'negligible' are deemed to be 'not significant' in EIA terms.

Table 1: Matrix used to determine the significance of effect.

		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

3.1.8 Cumulative, transboundary and inter-related effects

37 The EIA Regulations require a consideration of cumulative effects, which are effects on a receptor that may arise when the project is considered together with other proposed developments in the area. Cumulative effects are assessed and reported within each topic chapter of the ES, using the methodology outlined in Volume 1, Annex 3.1: Cumulative Effects Assessment (application ref: 6.1.3.1).

38 A consideration of transboundary effects is also given in each topic chapter, based on the outcome of the transboundary screening presented in Volume 1, Annex 3.2: Transboundary Screening (application ref: 6.1.3.2). Transboundary effects are those that may impact the interest of territories outside the UK Exclusive Economic Zone (EEZ).

39 There is also a requirement to consider inter-related effects between topics and across multiple project phases which may lead to environmental effects of greater significance than when they are considered in isolation. A consideration of inter-related effects is given in Volume 2, Chapter 14: Inter-related effects (application ref: 6.2.14).

4 Site selection

40 This section summarises the site selection process and approach undertaken for AyM to identify the various elements of the site and the alternatives (both onshore and offshore) which have been considered as the project has been developed.

41 The approach taken for the development of AyM has been based on early engagement with a range of stakeholders, together with a range of electrical, engineering, environmental, and socio-economic appraisals. Stakeholder engagement has been a key aspect of the project design, with each phase of consultation undertaken being designed to provide opportunities for stakeholders to review and provide information in order to influence the relevant project design decisions.

42 A full description of the site selection process is provided in Volume 1, Chapter 4: Site Selection and Alternatives (application ref: 6.1.4).

43 An overview of the process of site selection and the associated consultation that has informed the project design, is illustrated in Figure 2 below. It is important to note that, whilst the site selection process is illustrated and described as a linear approach in this document for ease of presentation, the reality of any project development is that site selection is a complex, iterative process with decisions made having considered multiple factors.

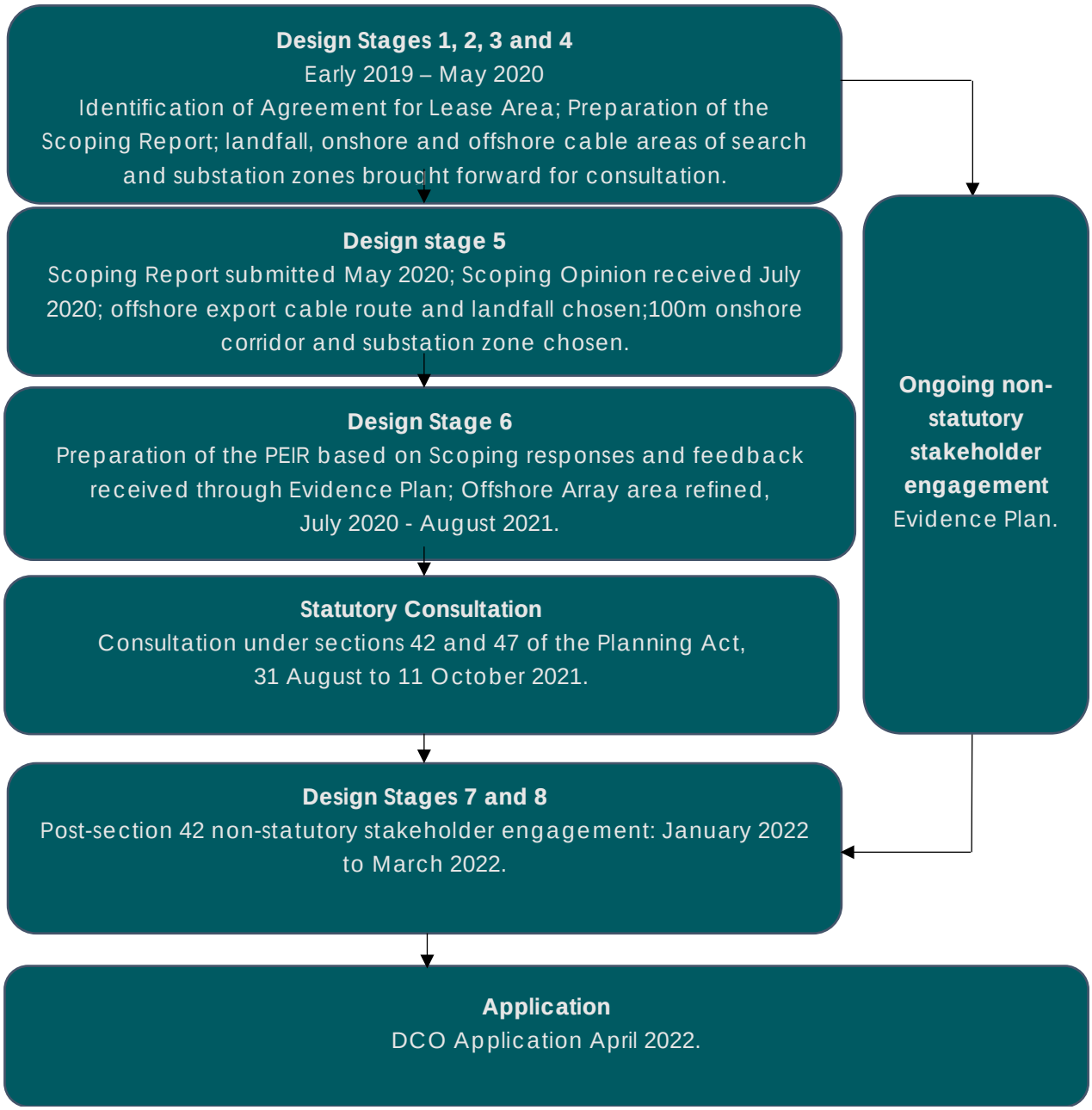

Figure 2: Summary of the AyM site selection process.

4.1 Stage 1 – Identification of the Array area

44 Further to the Welsh and UK Government's confirmed policies in support of offshore wind, there is a need to identify the best sites around the UK for a rapid increase in offshore wind development to occur and for renewable energy targets to be met. Given the presence of GyM, AyM's sister project, the region is identified as a good site for wind resource; confirmed by the operational output of GyM.

45 Further to, and associated with, the recognised policy need for offshore wind, The Crown Estate launched an opportunity in 2017 for existing wind farms to apply for project extensions. The projects were required to meet specific criteria, including who may make applications, and the siting requirements. The Applicant has met the requirements for 'who' may make an application.

46 Following an initial consideration of environmental parameters and constraints, an area of search was determined as a preliminary offshore boundary to delineate the location of offshore WTGs. The initial boundary was identified through an analysis of engineering, environmental, economic and consenting risks and subject to further feasibility studies for key areas of interest.

47 In parallel with this, existing environmental 'hard constraints' were considered, based on spatial data and an understanding of the likely constraints. The initial study considered an extension of GyM with a longer extension to the north-west on the basis of wind resource availability.

48 Following more detailed feasibility studies including shipping and navigation, offshore ornithology, underwater noise, and seascape, landscape and visual impacts, consultation was held with members of the EIA Evidence Plan ETG for Seascape, Landscape and Visual Impact Assessment (SLVIA) and Cultural Heritage[i]. The conclusion of the design process noted in Figure 2 against Stages 1-6, stakeholder consultation and public consultations, was therefore to revise the proposed boundary, reducing the north-westerly spread of the proposed development.

4.2 Stage 2 – Identification of Grid Connection Location

49 The connection of energy generating stations (such as OWF projects) to the National Grid, is managed through a controlled process by National Grid Energy Transmission Ltd (NGET). Initial proposals were made to make a grid connection at Bodelwyddan, the National Grid substation where the existing GyM connects into the National Grid. Since AyM is located in close proximity to GyM, a grid connection at the same location in Bodelwyddan is both practical and logical, given the previous work in determining a suitable and consentable grid connection.

50 Following on from the NGET offer of grid connection in Q2 2020, an initial desk-based assessment of potential landfall options on the North Wales coast was undertaken. This assessment looked into several environmental and technical constraints. Further engineering feasibility studies considered aspects such as construction space, ground conditions and access. The result was that an offshore cable route area of interest was delineated alongside the wind farm boundary, incorporating options for cable routeing and landfall at three locations along the North Wales coast.

[i] The EIA Evidence Plan is formed of a range of expert statutory, government, and non-governmental organisations providing advice on topics such as ecology, SLVIA, human environment, and offshore ornithology. Representatives on the Evidence Plan include Denbighshire County Council, NRW, and RSPB.

4.3 Stage 3 and 4 – Identification of Project for Scoping, and Consultation

51 Stage 3 of the AyM design process involved the identification of the offshore Export Cable Corridor (ECC) and landfall zone(s). During Stage 3 of the route design work, existing infrastructure such as railways, roads, ports, recreational areas and built-up areas were considered in an initial search area. The initial search area encompassed the North Wales coast. Following an initial appraisal, six options were brought forward for consideration.

52 Following a grid connection application, further onshore cable routeing work, a site walkover, input from electrical design and construction specialists, and consultation with stakeholders via the EIA Evidence Plan process, individual areas of search were identified for the offshore ECC landfall.

53 Stage 4 involved the identification of the onshore cable corridor and substation zone. In parallel with the Scoping phase of the AyM project, in May-July 2020, a long list of onshore cable corridors within the overall area of search was identified.

54 The substation area of search was defined as a 3 km buffer around the grid connection point at Bodelwyddan National Grid substation; this buffer distance was considered appropriate in order to minimise the works associated with an onward 400kV connection between the AyM OnSS and the National Grid substation. The boundary of the 3 km buffer was further refined to avoid the area of Bodelwyddan, existing settlements and environmental designations where possible. In May-July 2020, a longlist of substation zones within the overall search area was identified in parallel with the AyM project's Scoping phase.

4.4 Stages 5 and 6 – Refinement of Project for PEIR; statutory consultation

55 Following the scoping phase, further consideration was given to the consideration of the areas of search and a detailed appraisal was undertaken of the offshore and onshore export cable options, and the landfall options.

56 The offshore ECC, landfall, onshore cable corridor, and onshore substation, were subject to a process of multi-criteria analysis alongside a longlisting and shortlisting process, in order to identify a preferred route for the purposes of PEIR. Each longlist comprised up to 20 options and was reduced to a shortlist of around five to eight options, which was consulted on with the ETG membership through the Evidence Plan process, including Natural Resources Wales (NRW), local councils and the Welsh historic environment authority, Cadw.

57 For the offshore cable route, it was determined that the preferred option for offshore routeing would avoid the Constable Bank feature and route to the east, cross the existing GyM cable and make landfall to the east of Rhyl. The easterly offshore ECC, and associated landfall option offered considerably less risk from a technical, consenting and commercial perspective, and followed the advice provided by the ETG membership.

58 Following the identification of the landfall area of search six zones along the coastal stretch were identified. Further analysis was also undertaken for the onshore cable routes, to understand potential constraints and risks which may further influence the balance of landfall options. As a result of the analysis and consultation feedback, the landfall location at Ffrith beach was progressed.

59 For the onshore cable route, a series of sixteen routes were identified. Following an appraisal of these options, eight were discounted on a variety of environmental and engineering grounds, as well as consideration of land interests. The remaining eight options were therefore taken forward for further consultation with the EIA Evidence Plan panel. Following consultation, it was determined that the chosen onshore route would be progressed for the purposes of PEIR.

60 For the onshore substation identification, the initial area of search was refined to 14 possible substation zones. The zones were each analysed, with an eventual six possible substation zones put forward for consultation through the Evidence Plan process. Of the possible six zones, three were discounted directly as a result of stakeholder feedback. Of the remaining three, it was determined that one of the options would be discounted due to potential impacts to traffic, stakeholder feedback on archaeological risk, and ecological considerations.

61 Of the remaining two options, the constraints on the physical availability of the land at the two substation options fed into the assessment of mitigation and access. It was determined that one zone provided a greater availability of land for potential mitigation to be implemented. Another zone was comparatively constrained by existing woodland, properties to the east, and overhead lines to the north. In addition, an assessment of the potential access to the chosen zone identified that this was significantly less constrained, with multiple options that could improve choice, and involve less highway works and the associated construction disruption. As a result, the chosen zone was brought forward for the current phase of consultation.

62 The Applicant considers that these options and refinements were sufficiently justified and refined to enable stakeholders (through the consultation process) to meaningfully comment on the proposed scheme and its potential effects on the receiving environment.

4.5 Stage 7 – Refining of the Project Between PEIR and ES/ DCO Application Submission

63 Following publication of the PEIR, a number of modifications were made to AyM as a result of consultee feedback, informal consultation with landowners, further design refinements and engineering optimisation, and findings from additional environmental appraisals and surveys that were ongoing at the time of PEIR publication.

64 These include:

- A refinement of the proposed offshore array footprint, reduced from 88 km^2 to 78 km^2;
- A refinement of the maximum number of turbines, reduced from 91 to 50;
- A commitment to install cables by way of trenchless techniques such as Horizontal Directional Drilling (HDD) under the Rhyl golf course;
- Refined landfall access and Temporary Construction Compound (TCC);
- Refined onshore cable corridor from 100 m with an emerging preferred route, to a 40-60 m final route;

- Reduction in onshore cable optionality at the A55 crossing and south of Rhyl;
- A reduced onshore substation zone;
- Refined O&M accesses for the substation; and
- Refined 400 kV cable route.

65 A revision was made to the westerly extent of the array boundary as a result of concerns raised with regards to seascape impacts, and through consideration of the ability to reduce further the risks associated with shipping and navigation, and underwater noise. Whilst limited feedback was received on these latter concerns, the Applicant recognised the benefits of reducing impacts as far as practicable. In reducing the array boundary and seeking to minimise harm to designated sites (protected areas) as far as practicable, the Applicant also reduced the array design by reducing the total number of turbines. As such, the Applicant has reduced the number of turbines from 107 as proposed during scoping, to 91 within the PEIR and a final maximum design of 50 turbines for the purposes of the final application; a reduction of 53% across the phases.

66 A design decision was made to commit to no above-ground works within the grounds of Rhyl Golf Club. This means that cables will be installed by HDD (or other trenchless technique) entirely underneath the golf course, with no need for above-ground works. It may be necessary to enter the golf course to monitor drill progress, but there will be no requirement for intrusive works.

67 As a result of this refinement, and the need to coordinate construction of AyM with the operation of the Central Prestatyn Coastal Defence Scheme, a new, alternative landfall/ beach access route was introduced, with an associated TCC. The access route and TCC location were determined following through consultee feedback engagement, and consideration of the technical and environmental constraints.

68 Other refinements have been introduced to minimise traffic- and noise-related impacts to residential properties, minimise habitat loss and distance work from nearby residential and commercial receptors.

4.6 Stage 8 – submission of final preferred option(s) as part of the DCO and ML(s) application.

69 The final boundaries and routes for the AyM application can be seen in detail within the plans that accompany the application for development consent. The final boundaries and routes are considered to balance environmental and technical constraints, whilst taking into account feedback from landowners and other stakeholders wherever feasible.

5 Project description

70 This section of the NTS provides an outline description of the potential design of both the onshore and offshore project infrastructure, as well as the activities associated with the construction, O&M and decommissioning of AyM. A full project description is provided in Volume 2: Chapter 1: Offshore Project Description and Volume 3: Chapter 1: Onshore Project Description, (application ref: 6.2.1 and 6.3.1, respectively)

71 The Applicant is planning the development of AyM, located off the coast of North Wales, immediately west of and adjacent to the existing GyM, along with associated offshore and onshore infrastructure. The proposed development boundary encompasses:

- **The array area:** where the OWF will be located, which will include the WTGs, Offshore Substation Platforms (OSPs) and subsea cables;
- **The 'other wind farm infrastructure zone':** where a single meteorological mast, Permanent Vessel Moorings and subsea cables may be located;
- **The GyM interlink area:** which facilitates a single cable connection to the existing GyM;
- **The offshore Export Cable Corridor (ECC):** where up to two offshore export cable circuits will be located to bring the power generated to shore;
- **Landfall:** where the offshore cables are brought ashore east of Rhyl and are connected to the onshore cable circuits;
- **The onshore ECC:** where the onshore cable circuits will be located;
- **The onshore substation:** where the onshore substation will be located to facilitate transfer of electricity to the National Grid network; and

- **The National Grid substation**: where the 400 kV onward connection from the onshore substation will connect to the National Grid transmission network.

5.1 Offshore

72 At this stage in the AyM development process, decisions on exact locations of infrastructure and the precise technologies and construction methods employed cannot be made. Therefore, the project description at this stage sets out the main components and parameters of the project and the design envelope approach (often referred to as the 'Rochdale Envelope') has been used to provide certainty that the final project as built will not exceed these parameters, whilst providing the necessary flexibility to accommodate further project refinement during the detailed design phase post-consent.

73 The number of WTGs will not exceed 50. The two indicative WTG scenarios are as follows:

- Larger WTGs: The largest WTGs within the design envelope. For the purposes of assessment, this is assumed to be up to 34 of the largest possible WTGs with a Rotor Diameter (RD) of up to 306 m; and
- Smaller WTGs: The greatest number of WTGs within the design envelope. For the purposes of assessment this is assumed to be up to 50 smaller WTGs with a RD of up to 250 m.

74 Foundation structures are needed to securely support the WTGs, OSPs and met mast to the seabed, and will also provide safe access for O&M activities. A range of foundation types is being considered:

- **Piled foundations:** comprising either a single pile, or a steel lattice jacket structure supported by multiple smaller piles, which are driven into the seabed;
- **Suction caisson foundations:** comprising either a single suction caisson, or a steel lattice jacket structure supported by multiple caissons, which penetrate the seabed via suction; and
- **Gravity-based foundations:** comprising either a single foundation, or a steel lattice jacket structure supported by multiple legs, which sit on the seabed surface.

75 In terms of offshore cabling, the project will require array cables to connect the WTGs to each other and to the OSPs, as well as a single cable to connect the project to GyM. Up to two OSPs may be required, which would act as collection points for a network of array cables from individual strings of WTGs and then transmit the electricity generated to shore via up to two offshore export cables. The offshore cables will be buried, with cable protection required wherever burial is not possible.

76 Up to one meteorological mast (met mast) may be installed within the array area or within the 'other wind farm infrastructure zone' for the purposes of collecting detailed site-specific measurements of wind speed and other meteorological conditions.

77 Offshore construction is anticipated to take up to three years, after which the project is expected to be operational for approximately 25 years. Decommissioning of the project is anticipated to involve full removal of all project infrastructure, although some elements such as buried cables may be left *in situ,* should it be deemed more environmentally damaging to remove them closer to the time.

5.2 Onshore

78 The onshore aspects of the development will comprise all infrastructure required to transmit the energy from the landfall to the National Grid connection at Bodelwyddan. All cable infrastructure will be buried. The key onshore components of AyM include:

- Transition Joint Bays at the landfall location to connect the offshore cables to the onshore cable circuits;
- Up to two onshore cable circuits; and
- One substation and associated infrastructure to connect the project to the National Grid.

79 The landfall location is at Ffrith beach east of Rhyl and adjacent to Rhyl golf club. The works at landfall will include:

- Construction of the landfall temporary construction compound; and
- Works associated with trenchless techniques (such as HDD) or other suitable, alternative techniques to install cables under the beach and/ or trenching in the intertidal zone.

80 Onwards of the landfall location, cables will be buried by open trenching, with trenchless techniques used to install cables under obstacles such as roads and watercourses where appropriate. Once the cables are installed, the trenches will be backfilled using excavated material.

81 The onshore substation will be located within a compound to the west of St. Asaph Business Park (SABP), including landscaping to ensure visibility of the structure is minimised. An onward connection and works to connect to the National Grid substation at Bodelwyddan are also required.

6 Potential environmental effects

82 The EIA process has assessed the potential for the construction, O&M and decommissioning of AyM to create impacts upon the physical, biological and human environments, as characterised by a review and analysis of data collected via site-specific surveys, desk-based studies, peer reviewed literature, as well as modelling of specific parameters. This section of the NTS provides a summary of the assessments undertaken for AyM to date. Further, more detailed information is available within the topic-specific chapters found within the offshore and onshore volumes of the ES (Volumes 2 and 3 respectively).

6.1 Marine geology, oceanography and physical processes

83 The assessment of potential effects on the marine physical environment considers the potential for changes in tides, currents, waves and sediment transport as a result of the proposed development during construction, O&M and decommissioning. The assessment describes the existing physical environment and is supported by existing data as well as site-specific surveys to assess the predicted effects. The full marine physical processes assessment can be found in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes of the ES (application ref: 6.2.2).

84 AyM lies in an area with a typical spring tidal range of approximately 6.5 m, with tidal current speeds of between 0.75 and 1.0 m/s. The array area is open to north-westerly offshore waves that are generated within the Irish Sea. Locally-generated waves related to the prevailing winds come from westerly, north-westerly and northern sectors. To the north-east of the array, lies the permanent Liverpool Bay front which expands northwards from the River Dee. Stratification related to this front is predominantly associated with differences in salinity, although temperature gradients can also have a seasonal effect.

85 The seabed within the array area and offshore ECC is mostly comprised of sand, with varying proportions of gravel. Net sediment transport along the north Wales coast at the seabed level is easterly, with some transport of finer material in suspension. The geology of the AyM site has been shaped by a series of glacial events during the retreat of the British Isles ice sheet and Irish sea ice stream. Overlaying the bedrock is an extensive sequence of Quaternary coarse and fine-grained sediments.

86 Water depths in the array vary between 15.2 and 41.9 m, increasing towards the north-west. Water depths in the offshore ECC generally decrease with proximity to shore.

87 The impact assessment considers a range of features, processes and pathways that may be affected by the proposed development, such as changes to Suspended Sediment Concentration (SSC), tidal and wave regimes and sandbanks. The impacts considered include changes to the marine physical environment brought about both directly (as a result of the presence of infrastructure), as well as indirectly (through changes to physical processes themselves). Embedded mitigation measures such as scour protection and cable armouring have been adopted into the project design in order to mitigate potential effects.

88 During construction, effects due to changes to SSC, sandwave clearance and seabed preparation, impacts to sandbanks and the coastline were assessed as being of ***minor adverse*** significance, which is not significant in EIA terms.

89 During O&M, the assessment concluded that effects due to changes to the tidal and wave regime, sediment transport pathways and impacts due to seabed scour would also be of ***minor adverse*** significance, which is not significant in EIA terms.

90 In the decommissioning phase, the assessment concluded that effects as a result of potential changes to SSC, as well as changes to the coastline would be of ***minor adverse*** significance, which is not significant in EIA terms.

91 In terms of cumulative effects, the assessment considered that additional effects from AyM in combination with other plans, projects and activities such as aggregate extraction, dredge and disposal activities, would not result in any significant effects. No significant transboundary effects were predicted with regard to marine physical processes on the interests of non-UK states.

6.2 Marine water and sediment quality

92 The assessment of potential effects to marine water and sediment quality covers the marine and coastal areas within 18 km of the proposed development boundary, which is approximately equivalent to the maximum theoretical spring tidal excursion. The assessment considers the potential changes in marine water and sediment quality as a result of the proposed development during the construction, O&M and decommissioning phases of the proposed development, using existing data and site-specific survey data. A full description of the assessment can be found in Volume 2, Chapter 3: Marine Water and Sediment Quality (application ref: 6.2.3).

93 The offshore ECC lies within the North Wales coastal waterbody and the Clwyd transitional waterbody. The proposed development boundary is also within 2 km of five designated bathing waterbodies.

94 The sediments throughout the array area and wider study area are generally highly heterogeneous, although site-specific surveys showed that sediments in the south-west are generally coarser, with finer, sandier sediments being found further offshore. To assess the sediment quality and presence of contaminants within the array area and offshore ECC, two site-specific surveys have been undertaken. Sediment type is an important factor when considering the potential presence of contaminants; sediments with a finer particle size provide a higher surface area to volume ratio for adsorption of contaminants which may be released when sediment is disturbed. Sediments with larger particle sizes (e.g. sands) are not associated with anthropogenic contaminants.

95 Contaminant analysis revealed that metal concentrations in sediment samples were below the marine sediment quality guidelines within the array area, apart from arsenic, concentration levels of which were elevated, as a result of geological inputs from the north Wales coast region but remained below Action Levels 1 and 2 as set by the Centre for Environment, Fisheries and Aquaculture Science.

96 In terms of SSC, monthly averaged satellite imagery of Suspended Particulate Matter (SPM) suggests that within the AyM array area, average (surface) SPM is generally greater than 10 mg/l, increasing markedly throughout winter months. SSC increases with proximity to the coast and is at its highest within inshore and nearshore areas of the offshore ECC due to a combination of enhanced re-suspension from wave activity within shallow water and fluvial input of sediment.

97 The impact assessment considers the deterioration of water quality as a result of effects including increases in SSC, the release of sediment-bound contaminants and the accidental release of pollutants. Mitigation measures such as scour and cable protection, and the production of a Project Environmental Management Plan (PEMP) have been incorporated into the project to mitigate against potential effects.

98 In the construction phase, the assessments concluded that potential effects as a result of deterioration in water quality due to resuspension of sediments, release of sediment-bound contaminants and the accidental release of pollutants would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

99 During the O&M phase, it was concluded that deterioration in water quality due to the resuspension of sediments, release of sediment-bound contaminants and accidental release of pollutants would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

100 During decommissioning, deterioration in water quality as a result of resuspension of sediments, release of contaminants from sediment-bound contaminants and accidental release of pollutants would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

101 The cumulative effects assessment considered effects on water and sediment quality from AyM in combination with other projects and activities, including aggregate dredging and cable installation, and concluded that potential effects due to the release of contaminants from disturbed sediments would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms. The assessment concluded that there would be no transboundary effects in terms of marine water and sediment quality receptors.

6.3 Offshore ornithology

102 The assessment of potential impacts to offshore ornithology is focused on individual bird species and populations, rather than sites designated for birds. Only where likely significant effects on bird species are predicted, are associated designated sites taken into account, with a full , submitted separately within Report 5.1: Report to Inform Appropriate Assessment (application ref: 6.5.1).

103 The offshore ornithology study area includes the proposed AyM array area with a 4 km buffer around it; an 8 km buffer to the south of the array to cover coastal areas, as well as the offshore ECC up to the Mean Low Water Springs (MLWS) mark. The assessment considers potential effects on offshore ornithology in the construction, O&M and decommissioning phases of the proposed development, using existing data, site-specific survey data as well as results from collision risk modelling and displacement analysis. A full description of the assessment can be found within Volume 2, Chapter 4: Offshore Ornithology (application ref: 6.2.4).

104 Species included within the assessment are those recorded during site-specific aerial surveys that are considered to be at potential risk from the proposed development due to being present in high abundances and those considered to be at risk due to species-specific characteristics such as flight height. The assessment is also informed by monitoring at the existing GyM site. Consequently, the species considered include red-throated diver, common scoter, guillemot, razorbill and gannet. The numbers and distribution of species identified within the array are presented in full within Volume 2, Chapter 4.

105 The impact assessment considers potential effects on offshore ornithology receptors as a result of the construction, O&M and decommissioning phases of the proposed development. The key issues for the assessment are disturbance and/ or displacement of foraging seabirds and collision of individual seabirds with offshore infrastructure leading to injury or mortality. Embedded mitigation includes a commitment to a minimum wind turbine blade tip height of 22 m above Mean High Water Springs (MHWS), which reduces collision risk since the majority of birds fly below this height.

106 During construction, the assessments concluded that potential effects as a result of direct disturbance and displacement, as well as indirect effects through impacts to habitats and prey species, would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

107 In the O&M phase, the assessments concluded that potential effects due to direct disturbance and displacement, indirect effects through impacts to habitats and prey species, collision risk, and barrier effects would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

108 During decommissioning, the conclusions of the assessments were that potential effects due to direct disturbance and displacement, and indirect effects through impacts to habitats and prey species would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

109 In terms of cumulative effects, the assessment considered the combined effects of AyM together with other plans, projects and activities, considering the cumulative effects of direct disturbance and displacement and the operational collision risk. Cumulative effects were concluded to be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

6.4 Benthic subtidal and intertidal ecology

110 Benthic ecology refers to seabed habitats (including intertidal) and associated animals that live on and within the seabed together with the way these interact with each other and with the wider marine system. The assessment of potential impacts to benthic subtidal and intertidal ecological receptors considers the potential effects of AyM on the subtidal and intertidal benthic ecology as a result of the construction, O&M and decommissioning of the proposed development within the study area. The study area encompasses the array area and offshore ECC, as well as an 18 km buffer around the array and an 8.5 km buffer around the offshore ECC. The assessment draws on existing data where relevant, as well as site-specific benthic characterisation surveys undertaken for the project, and an intertidal habitat survey. The full assessment can be found within Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (application ref: 6.2.5).

111 The AyM benthic ecology study area is categorised by coarse sediments, broadly lacking in hard substrate, with mobile sand wave features in the eastern part of the array area and the offshore ECC. The sedimentary characteristics of AyM show a spatial pattern linked to the geophysical characteristics of the seafloor, where particle size distribution is linked to the degree of sediment mobility. Isolated patches of coarser gravel, pebble and cobble were identified in the offshore ECC, characterised by species which have an affinity to coarser sediments. The site-specific surveys identified several habitat types, biotopes, biotope complexes and communities consisting of species of polychaetes, bivalves and annelids.

112 Within the intertidal, the foreshore is predominantly comprised of sand, with areas of muddy sand interspersed across the mid shore. Areas of consolidated mud are present in the mid and upper shore, as well as anthropogenic structures including an outfall pipe and sea defences, where the honeycomb worm *Sabellaria alveolata* was present.

113 The impact assessment considers the potential effects on benthic subtidal and intertidal ecology as a result of impacts including direct disturbance and temporary habitat loss, indirect effects from increases in SSC and sediment deposition, and effects due to the colonisation of seabed infrastructure. Mitigation measures include definition of the proposed development boundary to minimise environmental impacts, the burial of cables where practicable, and adherence to best practice guidelines to minimise the introduction and spread of marine Invasive and Non-Native Species (INNS).

114 In the construction phase, the assessment concluded that potential effects as a result of temporary habitat disturbance, temporary increases in SSC and sediment deposition, and marine INNS would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

115 During the O&M phase, it was concluded that potential effects due to long-term habitat loss/ change, colonisation of subsea infrastructure, disturbance due to maintenance activities, disturbance due to Electromagnetic Fields (EMF), and changes as a result of changes to physical processes would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

116 In the decommissioning phase, the assessment concluded that potential effects due to temporary disturbance, temporary increases in SSC and sediment deposition, loss of habitat due to removal of seabed infrastructure, and permanent habitat loss due to infrastructure left *in situ* would be of ***minor adverse*** significance, which is not significant in EIA terms.

117 Potential cumulative effects considering AyM alongside other plans, projects and activities in the region, were predicted to be of ***minor adverse*** significance, which is not significant in EIA terms.

6.5 Fish and shellfish ecology

118 The assessment of potential effects on fish and shellfish ecology considers the impacts as a result of the construction, O&M and decommissioning of AyM. The assessment has drawn on extensive existing data, monitoring programmes as well as regional studies and the distribution data of spawning and nursery grounds. The assessment has also drawn upon results from underwater noise modelling undertaken to investigate the impacts of underwater noise from piling during construction. The full assessment is presented in Volume 2, Chapter 6: Fish and Shellfish Ecology (application ref: 6.2.6).

119 Based on existing datasets, including surveys, a wide range of species are known to inhabit the fish and shellfish study area, including cod, whiting, plaice, common sole, herring, mackerel, sandeel, spotted ray, thornback ray, dab and common dragonet. Shellfish known to occur include edible crab, queen scallop and king scallop.

120 The Irish Sea also provides important spawning and nursery grounds for a variety of species including spurdog, herring, whiting, cod and sole.

121 Several species of conservation importance have also been recorded, designated under the Habitats Regulations, including Atlantic salmon, European eel, allis shad, twaite shad, and river and sea lamprey. Other species protected under the Environment (Wales) Act include sea trout, smelt, basking shark and angel shark.

122 The impact assessment considers the potential effects on fish and shellfish ecology from impacts including direct damage and disturbance, increases in SSC and sediment deposition, noise due to piling, the release of pollutants, long-term habitat loss from the presence of seabed infrastructure, and EMF effects. Mitigation measures include the use of soft-start piling, pollution control measures such as the following of a PEMP, and the burial of cables where practicable to reduce effects from EMFs.

123 During construction, potential effects from direct damage and disturbance, temporary increases in SSC and sediment deposition, release of sediment-bound contaminants, and underwater noise and vibration were concluded to be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

124 In the O&M phase, the assessment concluded that potential effects as a result of long-term habitat loss from the presence of seabed infrastructure, increased presence of hard substrate and structural complexity, operational underwater noise, EMFs, disturbance from maintenance activities, indirect disturbance from the accidental release of pollutants, and displacement of fishing pressure would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

125 In terms of decommissioning activities, the assessment concluded that potential effects would be of no greater significance than for the construction phase, if project infrastructure is completely removed during decommissioning. If it is deemed closer to the time of decommissioning that removal would result in greater environmental impacts than leaving certain components *in situ*, then leaving *in situ* may be preferable, in which case potential effects would be of no greater significance than for the O&M phase (***negligible*** to ***minor adverse***, which is not significant in EIA terms).

126 The assessment considered cumulative effects of AyM in combination with other OWFs, cable installations, and dredge and disposal areas. The assessment concluded that potential cumulative effects from habitat loss, increases in SSC and sediment deposition, underwater noise and vibration, long-term habitat loss and EMFs would be of ***minor adverse*** significance, which is not significant in EIA terms. It was also concluded that there would be no transboundary effects on other states as a result of the proposed development.

6.6 Marine mammal ecology

127 The assessment of potential effects on marine mammal ecology describes the potential impacts on marine mammal species that may arise from the construction, O&M and decommissioning of AyM. It considers effects within the marine mammal study area, which varies according to the management unit of the individual species in question. The marine mammal assessment has been based on existing data and site-specific aerial surveys, as well as underwater noise modelling to assess impacts associated with construction piling noise. The full assessment can be found in Volume 2, Chapter 7: Marine Mammals (application ref: 6.2.7).

128 A number of marine mammal species have been identified as being present within the marine mammal study area, including harbour porpoise, bottlenose dolphin and grey seal.

129 The impact assessment considers the potential effects on marine mammals as a result of impacts including underwater noise, vessel interactions, disturbance and seal haul-out sites, changes in water quality, and the loss of prey resources due to changes in benthic habitats and the fish and shellfish community. Mitigation measures include a Marine Mammal Mitigation Protocol for piling, soft-start piling, and pollution prevention measures including the production of a PEMP.

130 During the construction phase, the assessment concluded that potential effects due to underwater noise, vessel interactions, changes to water quality and prey abundance would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

131 In the O&M phase, the assessment concluded that potential barrier effects, vessel interactions, changes to water quality and prey abundance would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

132 During decommissioning, effects would be similar to or less than those occurring in the construction phase. Therefore, the assessment concluded that potential effects due to underwater noise, vessel interactions, changes to water quality, and indirect impacts on prey species would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

133 In terms of cumulative effects, the assessment considered effects from AyM together with other plans, projects and activities and concluded that potential effects would be of ***negligible*** to ***minor adverse*** significance (not significant in EIA terms) for all species. With regard to transboundary effects, the assessment concluded that impacts from AyM would be localised and of ***negligible*** to ***minor*** significance, and transboundary effects were not considered further. The potential for significant effects on European designated sites in other states is specifically addressed within the HRA.

6.7 Commercial fisheries

134 The assessment of potential impacts to commercial fisheries considers impacts to commercial fishing activity, which is defined as the activity by licensed fishing vessels undertaken for the legitimate sale of finfish and shellfish. The assessment was based on multiple data sources including UK fisheries statistics, Vessel Monitoring System data, as well as information obtained through industry consultation with local fishermen. The full assessment is presented in Volume 2, Chapter 8: Commercial Fisheries (application ref: 6.2.8).

135 The key fleets operating across the commercial fisheries study area include UK vessels targeting shellfish species, in particular whelk, king and queen scallop, lobster, common prawn and crab, as well as UK vessels targeting mixed demersal species, in particular bass, flounder and thornback ray.

136 Larger vessels, including dredgers and potters, target particular species all year round, but a portion of vessels will form part of a local UK multi-purpose fleet comprised typically of vessels under 10 m in length which switch between gears to adapt to seasonal variations in fisheries.

137 Landings from the fleets in the study area in terms of landed volume and value are dominated by shellfish species; over 90% of landings between 2015 and 2019 were shellfish, whilst the remainder is accounted for by demersal species.

138 The impact assessment considers potential effects to commercial fisheries due to changes to fish and shellfish populations, safety issues, increased steaming times to fishing grounds, interference to static and mobile fishing gear, and displacement of fishing activity due to the presence of infrastructure. These potential impacts are considered in the context of different types of fishing activity (e.g. potting and beam trawling), and in the context of the country of origin. Mitigation measures include liaison with commercial fisheries stakeholders, the burial of cables where practicable to prevent damage to fishing gear, regular WTG spacing and layout, and the following of a dropped objects procedure.

139 During construction, potential effects as a result of displacement of activity leading to gear conflict, disturbance to commercially important fish species, increased vessel traffic and increases in steaming times to established fishing grounds would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms. Impacts as a result of reduction in access to fishing grounds were predicted to have moderate adverse (significant in EIA terms) effects on the potting fleet in the absence of mitigation. With the application of mitigation through the Fisheries Liaison Plan, which may include co-operation agreements, the effect is concluded to be of ***minor adverse*** significance, which is not significant in EIA terms.

140 During the O&M phase, potential effects due to impacts to fishing activities, safety issues, interference with fishing gear, increased steaming times to fishing grounds, and displacement of fishing activity were assessed as being of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

141 In the decommissioning phase, potential effects were predicted to be of no greater significance than in the construction phase.

142 In terms of cumulative effects, the assessment considered that the effects of AyM in-combination with other plans, projects and activities would be of no greater significance than ***negligible*** to ***minor adverse***. The assessment of transboundary effects forms an integral part of the assessment and no significant transboundary effects were predicted.

6.8 Shipping and navigation

143 The shipping and navigation assessment considers the potential impacts arising from the construction, O&M and decommissioning of AyM on shipping and navigation receptors within the study area, which includes the array area plus a 10 nm buffer, as well as the offshore ECC plus a 5 nm buffer. The assessment involves a Navigation Risk Assessment (NRA), which identifies hazards and the likelihood of those hazards occurring, to give a conceptual understanding of navigational risk to vessels including recreational craft, commercial traffic and fishing vessels. The full assessment is presented in Volume 2, Chapter 9: Shipping and Navigation (application ref: 6.2.9). The assessment is underpinned by a risk-based approach which differs slightly from the broader EIA methodology but aligns with industry best practice.

144 In terms of the existing environment, the key navigational feature in the area is considered to be the Liverpool Bay Traffic Separation Scheme International Maritime Organisation adopted routeing measure, given that it dictates the majority of vessel routeing in the area. Liverpool is the busiest port in the study area, which has between 6,000 and 7,000 vessel arrivals per year. There are also five pilot boarding stations associated with the nearby ports. Two charted anchorage areas are located to the east and north-east of the array, associated with the port of Liverpool.

145 The main vessel types recorded in the 2020 winter vessel traffic survey were cargo vessels, tankers and wind farm vessels. Fishing vessels, marine aggregate dredgers, tugs, passenger vessels, recreational vessels and oil and gas vessels were also recorded.

146 The impact assessment considers potential effects on shipping and navigation receptors due to collision risk between vessels, allision risk between vessels and wind farm infrastructure, traffic routeing, pilotage and recreational activities. Mitigation includes appropriate lighting and marking, the promulgation of information to the relevant stakeholders and marking of the wind farm on navigational charts.

147 In the construction phase, the assessment concluded that effects from increased collision and allision risk, restriction of adverse weather routeing, reduced access to ports and reduction in Search and Rescue (SAR) capabilities would be ***broadly acceptable*** to ***tolerable*** (not significant in EIA terms).

148 During O&M, the assessment concluded that effects from increased collision and allision risk, restriction of adverse weather routeing, reduced access to local ports, reduction in SAR capabilities, reduction in under-keel clearance and anchor interactions would be ***broadly acceptable*** to ***tolerable*** (not significant in EIA terms).

149 Effects during decommissioning are assessed as being no greater than those during the construction phase.

150 In terms of cumulative effects, the assessment considered that effects on shipping and navigation receptors from AyM alongside other plans, projects and activities would be ***broadly acceptable***, which is not significant in EIA terms. Transboundary effects are considered inherently within the NRA and no significant transboundary effects were predicted.

6.9 Seascape, landscape and visual impacts

151 The SLVIA considers the effects of the offshore components of AyM as a result of changes to the seascape/ landscape as an environmental resource in its own right, as well as on people's views and visual amenity. The assessment considers potential effects within a 50 km radius study area (the area that the tips of the WTGs are theoretically visible from) and uses a combination of landscape/ seascape character assessment, and computerised visual representations from a variety of sensitive viewpoints within the Zone of Theoretical Visibility through a site-specific survey to assess the potential effects. More detailed information is available in Volume 2, Chapter 10: SLVIA (application ref: 6.2.10).

152 The majority of the study area is covered by the sea, characterised by a number of Seascape Character Areas and Marine Character Areas. The southern part of the Irish Sea is a busy area, with multiple offshore activities including fishing, main shipping routes, oil and gas extraction and dredging. Offshore wind farms extend into the north-west of the study area. These activities also influence the night-time character with lighting on the main offshore platforms and wind turbines across the area. The sea is shallow, generally less than 40 m deep, and is sheltered with low tidal flows.

153 The landscape character of the study area is highly varied and derived largely from its diverse underlying geology and resulting landform. In the west lies Anglesey which is characterised by a diverse scenic coastal strip in the east with relatively little development, cliffs and bays. Separating the Isle of Anglesey and the Menai Strait from the Snowdonia foothills lies the Arfon lowland area that runs from the north-east to the south-west. To the east of the Snowdonia upland area lies the landscape of the Conwy Valley, which is the valley of Wales' longest tidal river. The valley effectively forms the border between the north-east and the north-west of Wales. To the north, the North Wales Coast extends from the prominent headland of the Great Orme in the west to the Point of Ayr in the east. This stretch of coastline is indented by a number of bays, many of which are characterised by towns and villages that are popular with tourists. Further inland, the land rises providing containment to the coast and less developed uplands. This is with the exception of the lower lying Vale of Clwyd which runs away from the coast set below the Clwydian Range.

154 In terms of landscape designations, of particular importance to the SLVIA are the Anglesey Area of Outstanding Natural Beauty (AONB), Clwydian Range and Dee Valley AONB, and Snowdonia National Park, which are located at distances of 16.9 km, 23.4 km and 16.6 km from the AyM array area at their closest points, respectively. There are also several areas within the study area that have been defined as Heritage Coast. On the Isle of Anglesey, these coincide with northerly parts of the Isle of Anglesey AONB coastline.

155 A number of viewpoint locations have been agreed with the SLVIA and Cultural Heritage consultees through the scoping and consultation process. These include both representative and illustrative seascape, landscape and visual viewpoints, viewpoints that are associated with the effects on the settings of cultural heritage features and assessed in Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage (application ref: 6.2.11) and locations of interest in relation to the tourism assessment included in Volume 3, Chapter 4: Tourism and Recreation (application ref: 6.2.4).

156 Views of offshore wind farms can evoke a range of responses from the people who view them, with some describing them as 'intrusive', 'ugly' or 'imposing'. Others report positive visual effects of offshore wind farms, describing them as anything from 'grand' to 'inspiring' or 'beautiful'. Although the SLVIA considers visual effects as a worst-case to be negative, it should be noted that equally, many find the visual effects to be beneficial.

157 Consultation with regards to SLVIA has been undertaken via an Expert Topic Group, with numerous meetings held between December 2019 (pre-scoping) and January 2022 with representatives from the SLVIA ETG, including NRW, Cadw, Snowdonia National Park and the various local planning authorities in attendance. Public consultation was also undertaken online.

158 Publication of the AyM OWF Scoping Report and the section 42 consultation process also provided opportunities for feedback which have been considered in preparing the ES.

159 The effect that results from the additional turbines of smaller size (max tip height of 282 m WTGs) in the MDS smaller WTG scenario, is considered to be outweighed by the larger height and scale of the max tip height of 332 m WTGs in MDS larger WTG scenario, and it is therefore MDS larger WTG scenario that informs the main assessment of seascape, landscape and visual effects. In the construction, O&M and decommissioning phases, a range of effects on seascape character, landscape character, designated areas and viewpoints have been predicted, ranging from ***non-significant*** to ***significant***, in EIA terms. The effect of the construction, operation and decommissioning of the offshore elements of AyM has been assessed as Minor (Non-significant) on all seascape, landscape and visual receptors within England and the English Marine Plan Areas. In addition, there will be no significant effects on the seascape, landscape and visual resource of Flintshire, Denbighshire or the Clwyddian Range and Dee Valley AONB. Significant seascape, landscape and visual effects of the offshore elements of AyM are contained within the areas of the Isle of Anglesey, Gwynedd, Snowdonia National Park and Conwy.

160 It has been assessed that there is potential for significant cumulative effects to arise in the south-eastern coastal areas of the Isle of Anglesey and in the north-eastern part of Snowdonia National Park and the north-western area of Conwy. No other significant cumulative or transboundary effects have been identified. The full assessment can be found in Volume 2, Chapter 10: SLVIA.

6.10 Offshore archaeology and cultural heritage

161 The assessment of potential effects on offshore archaeology and cultural heritage receptors considers the effects as a result of the construction, O&M and decommissioning of the offshore components of AyM. Data sources include existing data and maps, as well as site-specific data obtained through geophysical and geotechnical surveys. The offshore archaeology and cultural heritage baseline was assessed in relation to seabed prehistory and seabed features. The full assessment is presented in Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage (application ref: 6.2.11).

162 During the seabed features assessment, a total of 494 anomalies of archaeological potential were found in the array area plus a 500 m buffer, and six known wrecks, including the SS Albanian and the Dublin. A total of 132 anomalies of archaeological potential were identified within the offshore ECC, none of which are designated. The fuselage of an Avro Anson bomber aircraft was located in 1993 near Rhyl Buoy, the engines of which are thought to have already been removed, however the date and circumstance of this is unknown. A survey in 2000 did not locate any more aircraft wreckage and the record was amended to 'dead'. The findspot is located within the cable route and it is recorded by the UK Hydrographic Office as an obstruction.

163 There are no designated or known palaeogeographic sites within the array or offshore ECC. However, there is potential for archaeological material of prehistoric origin to exist within the study area.

164 The impact assessment considered effects as a result of permanent loss or disturbance of known or potential shallow seabed receptors and prehistory receptors, and indirect effects such as those from changes in sedimentation and erosion patterns. Mitigation includes the production of a Written Scheme of Investigation, which will outline mitigation measures, and the implementation of Archaeological Exclusion Zones (AEZs) around features of archaeological interest, in which no works will be undertaken.

165 During construction, the assessment concluded that potential effects due to the loss/ disturbance of seabed and archaeological receptors, as well as indirect effects due to changes in physical processes, would be of ***negligible*** to ***minor adverse***, which is not significant in EIA terms. ***Minor*** to ***moderate beneficial*** (significant) effects were also concluded in some cases where appropriate pre-construction archaeological investigation on seabed and prehistory receptors takes place.

166 During O&M, potential effects as a result of permanent physical loss of or disturbance of archaeological receptors, and indirect effects from changes to physical processes would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms. ***Minor*** to ***moderate beneficial*** (significant) effects were also predicted where appropriate archaeological investigation on archaeological receptors takes place.

167 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.

168 In terms of cumulative effects, the assessment considered the potential effects of AyM together with other plans, projects and activities. The assessment concluded that potential cumulative effects on known and unknown archaeological receptors would be of ***negligible*** to ***minor adverse*** significance. In some cases, ***minor*** to ***moderate beneficial*** (significant) effects were also predicted where appropriate archaeological investigation on archaeological receptors takes place. No transboundary effects are predicted to arise outside the UK EEZ.

6.11 Other marine users and activities

169 The assessment considers potential effects to offshore infrastructure as a result of the construction, O&M and decommissioning of AyM, including other OWFs, cables and pipelines and recreational fishing. The assessment draws on existing data, as well as industry consultation with charter anglers. The full assessment can be found in Volume 2, Chapter 12: Other Marine Users and Activities (application ref: 6.2.12).

170 There are a number of operational offshore wind farms in the Irish Sea region, including the adjacent GyM, North Hoyle, Rhyl Flats, as well as Burbo Bank and Burbo Bank Extension further east. There are also numerous subsea cables in the study area associated with these projects, as well as the Eirgrid East-West Interconnector that connects the UK to the Republic of Ireland. Several of these assets will need to be crossed by the AyM offshore export cables in order to reach shore.

171 To the north of AyM and GyM, a series of manned and unmanned oil and gas platforms are located. A pipeline runs south through the existing GyM site. Extensive sand and gravel extraction operations have taken place in Liverpool Bay. Currently, there are three licenced aggregate areas in close vicinity to the project, however none overlap with the array or ECC. Historically, significant quantities of material have been disposed of in Liverpool Bay.

172 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.

173 The assessment considered potential effects from the construction, O&M and decommissioning of AyM on other offshore wind farms, subsea cables and charter angling. Mitigation measures include the implementation of safety zones around active construction activities, advisory safety distances, promulgation of information to relevant stakeholders, the establishment of cable crossing agreements with relevant cable operators and the use of standard industry techniques to ensure no operational impacts to other subsea cables.

174 During construction, it was concluded that effects on other offshore wind farms, cables and pipelines and charter angling would be of ***minor adverse*** significance, which is not significant in EIA terms.

175 During O&M, it was concluded that effects on cables and pipelines and charter angling would be of ***minor adverse*** significance, which is not significant in EIA terms.

176 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.

177 In terms of cumulative effects, the assessment considered that effects from AyM in combination with other plans, projects and activities in the study area on charter angling would be ***minor adverse***, which is not significant in EIA terms. No transboundary effects outside the UK EEZ were predicted to arise.

6.12 Aviation and radar

178 The aviation and radar assessment considers the potential effects on military, aviation and radar receptors as a result of the presence of offshore wind farm infrastructure during the construction, O&M and decommissioning phases of the development. The full assessment is presented in Volume 2, Chapter 13: Aviation and Radar (application ref: 6.2.13).

179 A number of aviation and radar receptors were identified, including National Air Traffic Services radar systems and Ministry of Defence operational sites at British Aerospace Engineering Warton and Royal Air Force Valley. Other stakeholders included Chester Airport and the Ronaldsway Airport on the Isle of Man.

180 The assessment considered the potential for effects as a result of interference to radar systems, the presence of infrastructure as obstructions, as well as impacts to flight operations. Mitigation includes the notification of aviation stakeholders of the locations and specifications of infrastructure and associated construction and O&M activities, and the fitment of obstacle lighting to WTGs.

181 During construction, the assessment concluded that effects from the creation of an aviation obstacle would be of ***minor adverse*** significance, which is not significant in EIA terms.

182 During O&M, the assessment concluded that effects from the creation of an aviation obstacle, interference on military and civil aviation radar systems and impacts on offshore helicopter operations would be of ***minor adverse*** significance, which is not significant in EIA terms.

183 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.

184 In terms of cumulative effects, the assessment considered that effects from AyM in combination with other plans, projects and activities in the study area on charter angling would be ***minor adverse***, which is not significant in EIA terms. No transboundary effects outside the UK EEZ were predicted to arise.

6.13 Landscape and Visual

185 The onshore Landscape and Visual Impact Assessment (LVIA) considers the potential effects to the landscape and visual receptors as a result of the construction, O&M and decommissioning of the onshore components of AyM. The assessment was informed by desk-based study, site-specific photography, modelling and photographic visualisations (photomontages) of the proposed onshore infrastructure. The study area comprises a 1 km buffer around the landfall and onshore cable route, as well as a wider 5 km buffer around the onshore substation. A full description of the assessment can be found within the ES Volume 3, Chapter 2: Landscape and Visual Impact Assessment (application ref: 6.3.2).

186 The part of North Wales in which the proposed project is to be installed has a distinct coastal landscape, broadly characterised by the coastal towns and resorts which span its coastline of extensive beaches and dune landscapes. Inland from the coastline, the landscape of the study area is largely characterised by agricultural lowland landscapes which provide a rural backdrop to the coast. Further inland, the landscape tends to be characterised by the more elevated rolling hills of Rhos which transition to the more upland areas of the Denbigh Hills further to the south.

187 The landscape character of the landfall, onshore cable route, and proposed onshore substation is defined according to the National Landscape Character Area 'Colwyn and Northern Coastline', which is primarily coastal in character. The onshore cable route and onshore substation are not located within any designated areas.

188 Principle sensitive visual receptors within the study area include roads, settlements, recreational routes and other features from which visual receptors would experience views. The assessment identified several viewpoint locations which are described within the onshore LVIA chapter.

189 The assessment considered potential changes to physical landscape and landscape character, and effects on visual receptors. Embedded mitigation incorporated into the project design has included the site selection process, which considered landscape character and visual amenity alongside other technical and environmental constraints. For example, existing tree planting around the proposed substation area will provide visual screening for the majority of visual receptors in the area.

190 In the construction and decommissioning phases, it was concluded in the LVIA assessment that potentially significant short-term, reversible effects may occur on the physical landscape. Both ***non-significant*** and ***significant*** short-term, reversible effects were predicted to occur on landscape character, as well as on visual receptors. The predicted significant effects were predicted to occur as a result of the landfall, onshore cable route, and as a result of construction/ decommissioning of the substation.

191 During the O&M phase, the assessment concluded that there would be ***non-significant*** effects on physical landscape, landscape character and visual receptors related to the onshore cable route. With regards the onshore substation ***non-significant*** effects were predicted on landscape character after year 1, with ***significant*** and ***non-significant*** effects predicted on visual receptors in close proximity to the proposed substation zone. The assessment was undertaken on an outline worst case approach, in which a substation zone was assessed through identification of the worst-case location within the substation zone.

192 Cumulative effects were considered as part of the LVIA, with no significant effects predicted for the construction, O&M and decommissioning phases of the development.

6.14 Socioeconomics

193 The assessment of potential effects on socioeconomics considers effects as a result of the construction, O&M and decommissioning of AyM, examining the interaction between the proposed development and the local and wider economy within two study areas. It also considers the potential for the local labour force to absorb new employment opportunities in terms of capacity and skills profile. The baseline description has been informed using data from the study areas using existing relevant datasets from the Office for National Statistics (ONS), which provides data on population, labour market and employment conditions, and is described in detail within the socioeconomics chapter. A full description of the assessment can be found within the ES Volume 3, Chapter 3: Socioeconomics (application ref: 6.3.3).

194 Specifically, the assessment considers potential effects as a result of direct and indirect employment creation, Gross Value Added (GVA) creation, the potential for displacement of workers currently employed in other industries, and demand for housing. Measures to mitigate potential adverse effects include ensuring access for local businesses and supply chains to local employment opportunities.

195 The assessment concluded that potential effects during construction, O&M and decommissioning as a result of the impacts of direct and indirect employment creation, direct and indirect GVA creation, local employment, employment displacement, and impacts on demand for housing and accommodation would range from ***minor adverse*** to ***minor beneficial***, which are ***not significant*** in EIA terms. Beneficial effects are expected in terms of employment and GVA creation, as well as through local employment. No significant adverse effects are anticipated with the construction and operation of the project.

196 Cumulative effects as a result of AyM combined with other plans and projects in the region were concluded to be of ***negligible significance*** across all receptors, which is not significant.

6.15 Tourism and Recreation

197 The assessment considers the potential effects on tourism and recreational activities within the study area, including both onshore and offshore receptors, during the construction, O&M and decommissioning phases of AyM. The assessment of impacts to tourism and recreation identified four main study areas, focusing on direct and indirect onshore and offshore receptors, depending on the nature of the receptor assessed. The description of the existing environment draws on a review of existing data and includes maps, relevant legislation and policy and internet searches, as well as site-specific walkover surveys to identify additional features and levels of public use. A full description of the assessment can be found within the ES Volume 3, Chapter 4: Tourism and Recreation (application ref: 6.3.4).

198 The study identified onshore recreational resources including the tourism economy, Public Rights of Way (PRoW) and promoted trails and footpaths as resources that could potentially be affected by AyM. The study noted that nearly all of the resources identified appeared to be moderately used, however operating within their carrying capacity and aided by good levels of maintenance.

199 In terms of offshore recreational resources, the study identified bathing waters, water sports activities, sailing and recreational angling (as well as bait collection) as potential receptors. A full description of these offshore resources is provided within the tourism and recreation chapter.

200 The tourism economy is largely seasonal and is based on the more traditional seaside destinations, however the area benefits from all-weather attractions which encourage tourism all year round and varies considerably across the wider study area. Data suggests that tourism contributes over £1.47 billion to the Welsh Economy, although employment supported directly by tourism within the wider study area is comparable to that found nationally (around 14%).

201 The assessment considers potential effects on onshore and offshore recreational receptors, as well as on the tourism economy, as a result of restriction of access, modifications to rights of way, restrictions on parking, restriction of access to marine recreation, and visual intrusions arising from the proposed project. Mitigation includes keeping PRoW and promoted trails and footpaths open where practicable and reinstating disturbed PRoW following construction activities, as well as careful routeing of the onshore cable to avoid key areas of sensitivity.

202 During construction, potential effects due to direct and indirect effects on onshore and offshore recreation and utility users, were concluded to be of ***negligible*** to ***minor adverse significance***, which is not significant.

203 In the O&M and decommissioning phases, potential direct and indirect effects on onshore and offshore recreational users, as well as effects on the tourism economy, with the exception of the impact on onshore recreation, were concluded to be of ***negligible*** to ***minor adverse significance***, which is not significant in EIA terms.

204 Given that the onshore infrastructure is being designed to require no repairs, the assessment on operational activity having an impact on onshore recreation receptors is generally ***negligible/ minor adverse (not significant).*** In the case where repairs are required, which is extremely rare (indicatively one to two events per lifetime) the impact of operational activity on onshore recreation increases to ***moderate adverse (temporarily significant)***. In such cases, the overall nature of the impact will be localised (to the area of repair), temporary and limited to no more than a few months until the necessary repairs are completed.

205 The assessment concluded that there were limited projects that would contribute to cumulative effects for onshore or offshore tourism and recreation receptors, and hence no significant effects were identified.

6.16 Biodiversity and Nature Conservation

206 The assessment of potential effects on onshore biodiversity and nature conservation considered the impacts to sensitive onshore ecological receptors as a result of the construction, O&M and decommissioning activities associated with AyM, including terrestrial ecology and ornithology. For onshore biodiversity, the study area was based on a 2 km zone around the onshore project boundary. The assessment draws on existing data sources to identify nature conservation sites, as well as site-specific ecological surveys to identify the habitats and species present that could potentially be affected by AyM. A full description of the assessment can be found in Volume 3, Chapter 5: Onshore Biodiversity and Nature Conservation (application ref: 6.3.5).

207 The onshore elements of AyM are located on the North Wales coastline on low-lying, predominantly agricultural land, situated between the towns of Rhyl, Rhuddlan and the SABP. the River Clwyd bisects the study area, flowing from St Asaph northward into Rhyl.

208 There are a number of designated sites close to the study area, including Local Wildlife Sites, Special Protection areas, Special Areas of Conservation, Ramsar sites, Local Nature Reserves and Sites of Special Scientific Interest.

209 Habitats in the study area include cropland, fen marsh and swamp, neutral and modified grassland, hedgerows, scrub, standing and open water, rivers and streams, woodland, urban areas and beach sediments at the landfall.

210 Within the mosaic of habitats, there is the potential to support several notable and protected species, including bats, Great Crested Newts (GCN), water vole, badger, breeding and over-wintering birds, terrestrial and aquatic invertebrates, and vascular plants.

211 The assessment considered potential effects on ecological receptors as a result of direct damage and disturbance, habitat loss and pollution effects. Mitigation measures include the use of existing field access points where possible, the storage of topsoil (including the seedbank) in affected areas for re-instatement, protected species licensing and the implementation of an Outline Landscape and Ecology Mitigation Plan (OLEMP) (application ref: 8.4). The OLEMP provides summary details of mitigation and compensation measures incorporated into the onshore elements of AyM, as well as proposals for biodiversity enhancement. These proposals seek to address the requirement to promote the resilience of ecosystems, for example, woodland planting proposals.

212 The assessment concluded that following the implementation of appropriate mitigation measures, potential effects from accidental lethal or non-lethal injury, habitat loss, disturbance and accidental pollution would be ***non-significant*** in EIA terms.

6.17 Ground Conditions and Land Use

213 The assessment considers the potential effects on ground conditions, flood risk and land use due to activities associated with the construction, O&M and decommissioning of the onshore components of AyM. The study was based on a review of existing data sources such as the British Geological Survey (BGS) and NRW, as well as the findings of site-specific walkover surveys. The study area comprised the proposed onshore development boundary as well as a 1 km buffer around the proposed onshore substation at Bodelwyddan, and a 250 m buffer around the landfall and cable route. A full description of the assessment can be found within Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use (application ref: 6.3.6).

214 Land use within the Ground Conditions and Land Use study area is predominantly agricultural, situated between the settlements of Rhyl, Rhuddlan and St Asaph. The River Clwyd crosses the study area, flowing from St Asaph northward to the west of Rhyl. A number of other NRW designated main rivers also cross or are evident within the onshore ECC and the wider Ground Conditions and Land Use study area. Land to the south-west of the River Clwyd crossing is predominantly agricultural, with flat, low-lying land within the Clwyd valley, close to the estuary. Further south towards the A55 and beyond, land begins to rise up with more undulating topography. Field boundaries are typically well-established hedgerows and sometimes drystone walls. Woodlands and hedges are more common in this area.

215 There are no geological designations within the study area, and also no groundwater special protected zones. The majority of the study area is classified as of grade 3a or 3b good to moderate, or moderate, quality agricultural land. The superficial geology is generally classified as Glacial Till, with Marine Beach Deposits at the landfall location.

216 The assessment identified several sensitive receptors including soil land quality receptors. It considers the potential effects of AyM on ground conditions, and land use as a result of works. Mitigation includes implementation of a Pollution Prevention and Emergency Incident Response Plan (PPEIRP), a Soil Management Plan, adherence to a Code of Construction Practice (CoCP) (application ref: 8.13), and the effective design of site drainage to ensure that flood risk is minimised (including utilising Sustainable Urban Drainage Systems (SUDS) principles).

217 During construction, the assessment concluded that potential effects on soil and land quality would be of ***negligible adverse*** to ***minor adverse significance***, which are not significant in EIA terms.

218 In the O&M phase, it was concluded that potential effects on soil resource and land quality, in particular at the proposed substation, would be of ***negligible*** to ***minor adverse significance***, which is not significant in EIA terms.

219 In the decommissioning phase, it was concluded that potential effects on soil and land quality would be of ***negligible*** to ***minor significance.***

220 The cumulative effects assessment considered AyM alongside other planned and proposed projects and concluded that there were no significant effects.

6.18 Hydrology and Flood Risk

221 The assessment considers the potential effects on hydrology, hydrogeology and flood risk, due to activities associated with the construction, O&M and decommissioning of the onshore components of AyM. The study was based on a review of existing data sources such as the BGS and NRW flood risk data, as well as the findings of site-specific walkover surveys. The study area comprised the proposed onshore development boundary plus a 1 km buffer around the proposed onshore substation, and a 250 m buffer around the landfall and the onshore ECC (including access routes and TCC areas). A full description of the assessment can be found in Volume 3, Chapter 7: Hydrology, Hydrogeology and Flood Risk (application ref: 6.3.7).

222 The coastal area at the proposed landfall is between the relatively densely populated settlements of Rhyl and Prestatyn. Pedestrian footpaths are present directly adjacent to the beach, as is a golf course and caravan park. Man-made sea-defences including imported rocks are present, along with groynes which serve shingle and sand beaches.

223 Land use within the hydrology, hydrogeology and flood risk study area is predominantly agricultural, situated between the towns of Rhyl, Rhuddlan and St Asaph. The Afon Clwyd bisects the onshore ECC study area, flowing from St Asaph northward into Rhyl. A number of other NRW designated main rivers also cross or are present within the onshore ECC and the wider hydrology, hydrogeology and flood risk study area.

224 Land to the east and south of Rhyl is predominantly agricultural, low-lying land with a network of drainage ditches. Hedgerows and woodland are relatively scarce and limited to field boundaries.

225 Land to the south-west of the Clwyd crossing is predominantly agricultural, with relatively flat, low-lying land within the Clwyd Valley, close to the Clwyd Estuary. Further south, towards the A55 and beyond, land begins to rise with more undulating topography. Field boundaries are typically well-established hedgerows and sometimes drystone walls. Woodlands and hedges are more common in this area.

226 The assessment identified several sensitive receptors including surface water quality, groundwater, and flood risk receptors. It considered the potential effects of AyM as a result of works. Mitigation includes implementation of a PPEIRP, preparation of a Flood Response Plan (FRP), adherence to an FRP, and the effective design of site drainage to ensure that flood risk is minimised (including utilising SUDS principles).

227 During construction, the assessment concluded that potential effects on surface water, groundwater, and flood risk would be of ***negligible*** to ***minor adverse*** significance, which are not significant in EIA terms.

228 In the O&M phase, it was concluded that potential effects on surface water, groundwater, and flood risk, in particular at the proposed substation, would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

229 In the decommissioning phase, it was concluded that potential effects on soil and land quality would be of ***negligible*** to ***minor adverse*** significance.

230 The cumulative effects assessment considered AyM alongside other planned and proposed projects and concluded that there were no significant effects.

6.19 Archaeology & Cultural Heritage

231 The onshore historic environment assessment considered the potential for the construction, O&M and decommissioning of AyM to have effects on the archaeology and cultural heritage of the study area, which included the proposed onshore development boundary, as well as a 500 m buffer in all directions, and potential effects from offshore (wind turbines) on onshore receptors (historic setting). This was to allow information on heritage assets in close proximity to AyM to be collected in order to fully understand the potential for as-yet unrecorded assets. In order to understand the significance of potential effects, baseline data has been reviewed to identify known or suspected archaeological sites within the site boundary, and to characterise the heritage resource from the study area. A full description of the assessment can be found within Volume 3, Chapter 7: Onshore Historic Environment (application ref: 6.3.7).

232 The study area for the onshore historic environment reveals the coastline and onshore cable route to have potential interest that ranges from early prehistoric populations at Prestatyn and Rhyl, through to potential bronze age finds at landfall, and The Castles and Town Walls of King Edward in Gwynedd (a United Nations Educational, Scientific and Cultural Organisation (UNESCO) designated World Heritage Site). Whilst there is limited evidence of Romano-British influence and limited medieval settlement, evidence indicates small medieval settlements present at Cefn Du and Rhyd Orddwy, and a possible Romano-British enclosure at Bryn Cwnin.

233 The assessment considers the results of a combination of desk-based study and site-specific geophysical survey. The assessment identified evidence of prehistoric settlement near the River Clwyd, with the desk top study reporting finds from the Rhuddlan area noted as including flint, and a Neolithic axe. There is also evidence of bronze age activity in the area, and iron age settlement to the north of the onshore cable route.

234 More recent Historic Assets of interest identified in the study area, include Pengwern Hall, the Chain Radar Station at Rhuddlan, and Bodelwyddan Registered Park and Gardens. Further afield, sites considered for the potential effect on historic setting that may occur as a result of the offshore wind turbines, include Beaumaris Castle, the Menai Bridge, and The Castles and Town Walls of King Edward in Gwynedd World Heritage Site.

235 Within the wider region outside of the study area, there are a number of designated heritage sites along the north coast, comprising mainly Grade I and Grade II listed buildings, scheduled monuments, and the World Heritage Site.

236 The assessment considers potential direct and indirect effects on archaeological receptors, as well as effects due to changes in setting as a result of the proposed development. Mitigation includes careful routeing of the onshore cable route to avoid key areas of sensitivity, and the production of an agreed programme of archaeological work as identified through further work.

237 In the construction/ decommissioning phases, the assessment concluded that potential effects as a result of disturbances would be of ***negligible*** to ***minor adverse significance***, which is not significant in EIA terms.

238 During the O&M phase, potential effects resulting from changes in setting of the identified Heritage Assets, including Conservation Areas and listed buildings, were concluded to be of ***negligible*** to ***moderate adverse significance***. The only effect considered to be of moderate significance and therefore significant for purposes of the EIA regulations, is the visibility of WTGs alongside the pier from some viewpoints in Llandudno, and the change in some key views from the Llandudno Pier.

239 The cumulative effects assessment concluded that no adverse cumulative effects were anticipated.

6.20 Traffic and Transport

240 The assessment of potential effects on traffic and transport as a result of the construction, O&M and decommissioning activities associated with AyM within an identified study area defined as the highway network around the proposed project boundary. The study was informed by an initial desktop study to identify potential construction access routes, highway infrastructure and transport facilities within the proximity of the proposed development. Review of existing data, as well as the undertaking of surveys including automated and manual traffic counts, also informed the assessment.

241 In order to assess the potential effects of the construction phase of AyM on driver severance and delay, the peak hours on the highway network have been identified using the existing Department for Transport and Automatic Traffic Count data. A correction factor, agreed with statutory advisers, has been applied to account for changes in baseline traffic numbers associated with the outbreak of COVID-19, and the associated downturn in general activity. A full description of the assessment can be found within the ES Volume 3, Chapter 8: Traffic and Transport (application ref: 6.3.8).

242 The local highway network includes the A548, the A525 between Rhyl and the A55 Junction 27, Sarn Lane, and Glascoed Road. The A525 and A55 are dual carriageways subject to the national speed limit (70 mph). The A525 acts as the main connection between Rhyl and Newcastle-under-Lyme in England. The A55, also known as the North Wales Expressway, connects Chester to Holyhead carrying a significant amount of traffic on a daily basis.

243 Detailed vehicle, cyclist and pedestrian counts are presented within the traffic and transport chapter, however light goods vehicles make up the majority of the baseline vehicle flows. Accident trends or clusters were identified within the study area, on the Rhyl Coast Road (A548), the A525 between Rhyl and Rhuddlan, and the A547. The baseline environment also includes pedestrian, cycle, and bus routes within the local area.

244 The assessment considered the potential effects on traffic and transport receptors due to construction traffic associated with AyM. As part of the mitigation, a Traffic Management Plan to manage and control vehicle movements will be developed, and certain key roads will have the cables installed underneath them via use of a trenchless method such as horizontal directional drilling, rather than trenching.

245 In the construction, O&M and decommissioning phases of the development, the assessments identified that there would be no significant effects due to impacts including delays to drivers, public transport or pedestrian amenity, PRoW crossings, or accidents and safety. The assessment concluded that all potential effects would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms.

246 The cumulative effects assessment concluded that no adverse cumulative effects were anticipated.

6.21 Airborne Noise and Vibration

247 The noise and vibration assessment examines the potential effects that may be generated through the construction, O&M and decommissioning of AyM upon sensitive areas or premises used by people. To inform the study, calculations were made based on the attenuation of noise from various activities including construction noise associated with excavation and cable laying, piling at the substation, noise from construction traffic, and noise from the operational substation. A full description of the assessment can be found within Volume 3, Chapter 10: Noise and Vibration (application ref: 6.3.10).

248 The existing baseline has been characterised by a baseline sound survey undertaken in 2021 at multiple locations that were representative of noise sensitive receptors in the vicinity of AyM. The existing environment currently comprises a mix of rural, industrial, commercial and recreational uses. The existing ambient noise environment at each of the locations is described in detail within the noise and vibration chapter.

249 The assessment considered potential effects as a result of impacts due to temporary construction noise, construction traffic, offshore piling, and the operation of the onshore substation. Mitigation measures include the production of a Noise and Vibration Management Plan within the CoCP, which would set out requirements for construction such as the use of additional acoustic screens.

250 It was concluded that potential effects in the construction phase as a result of construction noise, traffic noise, vibration and offshore piling noise would be of ***minor adverse*** significance with mitigation, which is not significant in EIA terms.

251 In the O&M phase, it was concluded that potential effects from operational fixed plant (the substation) would be of ***minor adverse*** significance with mitigation, which is not significant in EIA terms.

252 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases. The cumulative effects assessment considered the potential effects of AyM in combination with other plans and projects in the area. No significant cumulative effects are predicted.

6.22 Air Quality

253 The air quality assessment has assessed the potential effects on air quality as a result of the onshore construction, O&M and decommissioning activities of AyM, including the landfall, onshore cable route, and substation. The assessment draws on existing data and air quality management reports by local authorities, as well as predicted traffic counts defined by the project description. A full description of the assessments can be found within Volume 3, Chapter 11: Air Quality (application ref: 6.3.11).

254 AyM is not located within any Air Quality Management Areas. The nearest (non-automatic) air quality monitoring stations are located around 0.7 and 2.5 km to the south of the proposed development boundary. Data from these stations between 2015 and 2019 showed that there have been no exceedances of Air Quality Objectives (AQOs for NO_2 or PM10).

255 The assessment considered the potential effects on air quality as a result of impacts due to construction dust and construction vehicle and plant emissions on human and ecological receptors. Mitigation measures include implementing a traffic management plan and adhering to standard guidance measures and good practice principles, as outlined in the CoCP.

256 During construction, the assessment concluded that potential effects due to increases in road traffic generated pollutant concentration and impacts from dust on human and ecological receptors would be of ***negligible*** significance, which is not significant in EIA terms.

257 In the O&M phase, potential effects due to increases in traffic-generated air quality pollutant concentrations on human and ecological receptors would be of ***negligible*** significance, which is not significant in EIA terms.

258 During decommissioning, potential effects due to dust impacts on human and ecological receptors would be of ***negligible*** significance, which is not significant in EIA terms.

259 The cumulative effects assessment considered the onshore elements of AyM alongside other planned projects and developments in the area, including residential development, and solar farms, and concluded that potential cumulative effects would be of ***negligible*** significance, which is not significant in EIA terms.

6.23 Public Health

260 The Public Health assessment chapter draws primarily on other assessments such as air quality, traffic, noise, hydrology, and tourism to understand the implications of AyM on public health. In addition to these topics, the public health chapter considers the potential effects associated with electromagnetic fields that may be emitted by AyM. A full description of the assessment can be found within Volume 3, Chapter 12: Public Health (application ref: 6.3.12).

261 As the onshore ECCs will be buried, potential impacts from electric fields have been scoped out from detailed assessment as burial is recognised as mitigating the potential effects. Further to this, all infrastructure built will comply with the government guidelines on electromagnetic radiation emission. During construction and O&M phases, the assessment concluded that potential effects would be of ***negligible*** to ***minor adverse*** significance, which is not significant in EIA terms. In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.

7 Next steps and further information

262 The submission of the ES and application for the DCO and ML(s) marks the end of the pre-application period under the Planning Act. Upon receipt of the application, PINS will have 28 days to decide whether or not to accept the application. If accepted, the pre-examination phase will begin, and members of the public will be able to register to share their views on the project.

263 Once the examination of AyM commences, the appointed Examining Authority has six months to examine the application and a further three months to make a recommendation to the SoS. The SoS then has three months to determine the application. In the event that a DCO is granted, the design and development of the project will continue to be progressed as the project moves further towards construction.

264 Key consultation documents will include the ES and details of the principles that would be applied to the design and construction of AyM. These documents will be available during the examination of the application, which will give members of the public an opportunity to engage with the examination process.

265 The marine licence application will be made separately to the Welsh Government, in parallel with the DCO application process. The responsibility for marine licensing in Wales lies with the Welsh Government, but the marine licence is administered by the NRW Marine Licensing Team on behalf of the Welsh Ministers.

Fferm Wynt Alltraeth

AWEL Y MÔR

Offshore Wind Farm

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Swindon Limited

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Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

Marine Licensing Team
Natural Resources Wales
29 Newport Road
Cambria House
Cardiff
CF24 0TP

Your reference:
Our reference:
Date: 30 May 2022

Mark Legerton
[redacted]

Date: 30 May 2022

Dear Sirs,

Marine and Coastal Access Act 2009: Part 4 – Marine Licensing

Awel y Môr Offshore Wind Farm Limited

Marine Licence for the proposed Awel y Môr Offshore Wind Farm

Awel y Môr Offshore Wind Farm Limited (the Applicant) encloses an application to Natural Resources Wales Marine Licence Team (NRW MLT) for Marine Licences under Part 4 of the Marine and Coastal Access Act (MCAA) 2009 (the ML Application).

1 SUBJECT OF THE APPLICATION

1.1 The Marine Licence (ML) Application is required to construct and operate the proposed Awel y Môr Offshore Wind Farm (the Project) located off the coast of North Wales. The Project comprises up to 50 wind turbine generators and associated infrastructure. The offshore aspects of the Project will be located within Welsh inshore waters.

1.2 The Project is a proposed sister project to the operational Gwynt y Môr Offshore Wind Farm. At its closest point, the Project's array area will be located approximately 10.5km off the North Wales coast at Llandudno and will include an offshore export cable corridor of approximately 21km in length.

2 OTHER CONSENTS

2.1 In addition to the ML Application, a Development Consent Order (DCO) from the Secretary of State is required as the Project is a Nationally Significant Infrastructure Project as defined by the Planning Act 2008. An application for a DCO was submitted on 20 April 2022 and accepted by the Planning Inspectorate on 18 May 2022 (the DCO Application).

2.2 As the offshore part of the Project is located in the Welsh inshore region, it will not be possible for the DCO to include a deemed Marine Licence within the DCO. A separate

[redacted]

application to NRW MLT for a Marine Licence is therefore required for certain offshore activities.

2.3 As well as the DCO and Marine Licence, the other consents and licences required to authorise the Project are listed in the Other Consents and Licences document submitted with the ML Application (doc ref 5.4).

3 APPLICATION FORMALITIES

3.1 The ML Application will be administered by NRW MLT on behalf of the Welsh Ministers as Licensing Authority. As set out in section 67(1)(a) of the MCAA 2009, NRW MLT may require an application for a Marine Licence to be made in a prescribed form. The ML Application is made using the appropriate Marine Licence application form which has been prescribed by NRW MLT.

3.2 NRW MLT has confirmed that separate Marine Licences for the Project's generation and transmission assets can be applied for and that these licences can cover the construction, operational and decommissioning phases of the development. A third Marine Licence is also sought to facilitate a proposed electrical connection to the existing Gwynt y Môr Offshore Wind Farm.

3.3 The Project is a development which requires an Environmental Impact Assessment (EIA) to be undertaken. An EIA has been undertaken as part of the DCO Application and is also submitted for the ML Application. NRW MLT confirmed by letter dated 6 October 2020 that it was deferring its EIA decision to the Secretary of State under Regulation 10(1)(b) of the Marine Works (Environmental Impact Assessment) Regulations 2007.

4 DOCUMENTATION ENCLOSED AND APPLICATION FEE

4.1 We have transferred the following documents to NRW MLT:

(a) The completed and signed application form;

(b) The relevant chapters and annexes of the Environmental Statement (ES) submitted with the DCO Application; and

(c) Each of the other documents listed as being required for the ML Application in the Guide to the Application document.

4.2 The Applicant is sending the documents electronically which will include redactions and confidential documents. The confidential documents will be marked as 'confidential' in the Guide to the Application.

[redacted]

5 DESCRIPTION OF THE PROJECT

5.1 The ML Application relates to the offshore aspects of the development outlined in paragraph 1.1 above and described in full in the Offshore Project Description chapter of the ES (doc ref 6.2.1).

5.2 The Marine Licence and associated DCO will, among other things, authorise:

(a) The construction and operation of up to 50 offshore wind turbine generators and their foundations;

(b) The construction of up to two offshore substation platforms and their foundations;

(c) The construction of one meteorological mast and its foundation;

(d) The construction of a network of subsea electrical cables connecting the wind turbine generators;

(e) Inter-link cables connecting the Project to the Gwynt y Môr Offshore Wind farm;

(f) The installation of up to two subsea export cable circuits to transmit the electricity generated by the wind turbine generators to shore. The Project's offshore export cable corridor extents south-eastwards from the array area to the proposed landfall east of Rhyl; and

(g) The construction of up to two transition joint bays at landfall connecting the offshore cables to the onshore cables.

6 HABITATS REGULATIONS

6.1 The ML Application documents include a Report to Inform an Appropriate Assessment (doc ref 5.2) which identifies all relevant European sites and provides sufficient information for the competent authority to determine whether the Project is likely to have an adverse effect on the integrity of any European site.

6.2 It concludes that the Project, together with mitigation and monitoring as proposed, is not expected to have an adverse effect on the integrity of any site. The Report to Inform an Appropriate Assessment has been discussed in detail with NRW as part of the Evidence Plan process for the DCO Application.

[redacted]

We look forward to hearing from you in relation to this application. If we can be of any assistance in that regard, please do not hesitate to contact Alex Herbert (Offshore Consents Manager) on [redacted] or [redacted]

Yours faithfully,

[redacted]

Mark Legerton
Director
Awel y Môr Offshore Wind Farm Limited
[redacted]
[redacted]

[redacted]

RWE

Awel y Môr Offshore Wind Farm

Guide to the Marine Licence Application

Date: May 2022

Revision: A

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

REVISION	DATE	STATUS/ REASON FOR ISSUE	AUTHOR:	CHECKED BY:	APPROVED BY:
A	May 2022	Application	SL	RWE	RWE

[redacted]

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Abbreviations and acronyms

TERM	DEFINITION
AyMOWFL	Awel y Môr Offshore Wind Farm Limited
HRA	Habitat Regulations Assessment
DCO	Development Consent Order
NRW-MLT	Natural Resources Wales Marine Licencing Team
PINS	Planning Inspectorate
RIAA	Report to Inform Appropriate Assessment

1 Guide to the application

1.1 Introduction

1 This navigation document summarises the structure of Awel y Môr Offshore Wind Farm Limited's (AyMOWFL) (the Applicant's) application for a Marine Licence(s) for the Awel y Môr Offshore Wind Farm (AyM) to Natural Resources Wales Marine Licencing Team (NRW-MLT). Its purpose is to provide an understanding of the structure of the Application and the principal contents within each "category" of documents; for ease of reference the document categories align with the document category system implemented for the purposes of the application for a Development Consent Order (DCO) which was submitted to the Planning Inspectorate (PINS) on 20 April 2022.

1.2 Document categories

1.2.1 Document overview

2 There are eight categories of application documents, as set out below.. As described previously, the system of categorisation has been maintained for ease of cross reference between the Marine Licence and the parallel DCO application process, it is noted that it is not a requirement of the Marine Licence application process. As discussed, and agreed with the NRW-MLT the full suite of DCO application documents, and associated categories, are not required for the Awel y Môr application for Marine Licence(s). For completeness however, the list of all documents submitted to the DCO process is retained, and the document titles colour coded according to their status with regards:

Required for Marine Licence(s) application;
Not required for Marine Licence(s) application, but provided for context;
Not Required or relevant for Marine Licence(s) application.

3 In identifying if a document is required for the Marine Licence application, reference has been made to NRW-MLT marine licencing guidance ([redacted]), specifically noting those activities for which a marine licence is required within the marine licensable area. For the Awel y Môr project, the relevant activities are:

- *Any deposit or removal of material or substance, using a vehicle or vessel. Deposits or removals by hand are not marine licensable activities*;
- *Construction, alteration or improvement works (including works hanging/suspended over the marine licensable area and works beneath the sea bed e.g. tunnels, bridges and piers*);
- *Dredging*.

4 In the context of the above bullets, only those documents that are considered to be specifically relevant to impacts likely to be experienced in the area seaward of Mean High Water Springs (the marine licensable area) are considered to be 'required'.

5 It is also noted that the version history of the documents listed below reflects the status following acceptance by PINS into the DCO process. The documents have not previously been submitted to the NRW-MLT but the version history is maintained for completeness and to avoid confusion.

- Category 1: Application Form
- Category 2: Plans
- Category 3: Draft Development Consent Order
  - Not required for Marine Licence application, but provided for context
- Category 4: Compulsory Acquisition Information
  - Not required for Marine Licence
- Category 5: Reports & Statements
  - Those documents of relevance to the Marine Licence only
- Category 6: Environmental Statement
  - Those documents of relevance to the Marine Licence only
- Category 7: Additional Information for Other Specific Types of Infrastructure

- Category 8: Other Documents
  - Those documents of relevance to the Marine Licence only

6 The paragraphs below identify the principal contents within each category.

1.2.2 Category 1: Application Form

7 This category contains the NRW-MLT Marine Licence Application Form, and this Guide to the Marine Licence(s) Application.

1.2.3 Category 2: Plans

8 This category contains the plan provided to accompany the Application for a Marine Licence(s).

9 The following plan identifies the proposed Marine Licence areas and how they align with the Order Limits proposed works for which Marine Licences (and development consent) is sought.

- Order Limits and Marine Licence area plans

10 Further plans included with the DCO application, but not provided with the application for Marine Licence(s), as they replicate information provided within other documents, and as such are not required, are as follows:

- Location Plan
- Land Plans (Offshore and Onshore)
- Special Category Land Plan
- Works Plan (Offshore and Onshore)
- Street Works and Access Plan
- Temporary Stopping Up of Public Rights of Way Plan Statutory/ Non-Statutory Nature Conservation Sites Plan
- Statutory/ Non-Statutory Sites or Features of the Historic Environment Plan
- Crown Land Plan
- Water Bodies in a River Basin Management Plan
- Hedgerow and Protected Tree Plan

1.2.4 Category 3: Draft Development Consent Order

11 This category contains the draft Development Consent Order (DCO) and the Explanatory Memorandum.

12 The draft DCO contains the legal powers which are being applied for in order to construct and operate the Project.

13 The Explanatory Memorandum explains the purpose and effect of each provision of the draft DCO.

14 The draft DCO is provided for reference and context alongside the wider documents submitted in support of the application for a Marine Licence(s).

1.2.5 Category 4: Compulsory Acquisition Information

15 This category contains compulsory acquisition information comprising the Statement of Reasons, Funding Statement and Book of Reference. These should be read alongside the Lands plans and draft DCO.

16 Category 4 is not considered relevant for an application for a Marine Licence(s).

1.2.6 Category 5: Reports & Statements

17 This category contains various reports and statements that are required to be provided in support of the Application.

18 The Consultation Report and associated appendices present the consultation activities which the Applicant has carried out in relation to its proposals for the Project, the responses to these consultation activities and how the Project has had regard to the responses, in accordance with the requirements of Section 42 of the PA2008. All feedback received has been recorded within specific technical chapters, and as such the Consultation Report is not provided alongside the Marine Licence application documents. To inform the Habitats Regulations Assessment (HRA), the Screening Report and the Report to Inform Appropriate Assessment (RIAA) contain the information necessary for the competent authority to carry out the appropriate assessment required under the relevant habitats legislation.

19 The statutory nuisance statement explains whether the Project would cause any statutory nuisance with regards the Environmental Protection Act 1990, which has an onshore focus and as such is not considered relevant for the application for a Marine Licence(s).

20 This category also contains details of consents and licences which are required under other legislation, which includes a document which outlines the Applicant's proposed approach to the Marine Licences, and the principles anticipated to inform the Marine Licence conditions.

1.2.7 Category 6: Environmental Statement

21 This category contains the Environmental Statement (ES), the PINS Scoping Opinion (adopted for the ML application) and the Non-Technical Summary (NTS) of the ES.

22 The ES is divided into six main volumes including appendices and sets out the assessment of the likely significant impacts of the construction, operation and maintenance, and decommissioning of the Project to existing physical, biological and human environments, and proposed mitigation measures. For the purposes of the application for Marine Licence(s) the six main volumes have been rationalised to only include those documents of specific relevance to the application for Marine Licence(s); certain onshore chapters and annexes included in the DCO application have therefore been highlighted as such in this document.

23 The NTS provides a full summary of the Project´s ES in non-technical language (Welsh and English language versions), including the assessments undertaken, the likely significant environmental effects and the means to avoid or reduce adverse effect.

24 The Scoping Opinion for the Project was provided by PINS in July 2020, includes the scoping opinion provided by NRW to PINS, and is included for reference.

1.2.8 Category 7: Additional Information for Other Specific Types of Infrastructure

25 These documents are required to be provided in support of the Application for a DCO, but have been submitted as part of the application for Marine Licence(s) for context.

1.2.9 Category 8: Other Documents

26 This category contains various additional documents which AyM has chosen to submit in support of its Application.

27 The Planning Statement presents and reviews the AyM proposals within the context of planning policy, and includes a Welsh National Marine Plan Policy checklist document.

28 The Evidence Plan Report sets out how the evidence plan process has been followed for the HRA and for the wider consultation on the Environmental Impact Assessment.

29 The Offshore Archaeological Written Scheme of Investigation describes how offshore archaeology will be identified, recorded and, where possible, avoided.

30 The Outline Landscape and Ecological Management Plan contains details of the mitigation measures proposed for landscape and ecological effects for onshore receptors. It includes mitigation relating to notable species that may be affected as well as proposals for the reinstatement of the cable route and screening planting for the onshore substation, and is therefore not included in the ML application.

31 The Fisheries Liaison and Co-existence Plan sets out how the project will engage with the fishing industry during construction and operation.

32 The Offshore Operations and Maintenance (O&M) Plan identifies the O&M activities assessed in the environmental statement.

33 The Design Principles Document sets out the design and landscaping parameters that the Applicant proposes to apply to the Onshore Substation when undertaking detailed design, and is therefore not included in the application for a Marine Licence(s).

34 The Disposal Site Characterisation Report describes and assesses the potential sites for offshore disposal of drill arisings from the installation of turbine foundations, sand wave clearance and dredging.

35 The Schedule of Mitigation summarises the mitigation measures contained in the ES and highlights where these are secured in the DCO or in the Marine Licence principles document.

36 The Schedule of Monitoring summarises the monitoring contained in the ES and highlights where these are secured in the DCO or in the Marine Licence principles document.

37 The Code of Construction Practice (CoCP) presents the minimum standards of construction practice that the Project will require of its contractors onshore. These standards would be incorporated in a detailed Construction Method Statement (CMS) post-consent and agreed with the relevant planning authority for matters relating to the onshore construction of the project; it is not therefore included in the application for a Marine Licence(s). The CoCP is accompanied by a number of outline management plans, which relate to onshore construction, and are not therefore included within the application documents for a Marine Licence(s).

38 The Community Linguistic Statement considers the potential effects of AyM on the Welsh language and culture and how the proposed development will protect, promote and enhance the Welsh language. Given its focus on onshore receptors it is not included with the application for Marine Licence(s).

1.3 Master document list

39 The master document list table is set out on the following pages and provides a full list of all the documents submitted to date, indicating either the latest revision (if applicable) or when a new document was submitted.

40 For ease of navigation these documents are grouped by categories as follows:

CATEGORY DETAILS	DETAILS
1. Application Form	Provides details of the specific application information required by NRW-MLT
2. Plans	Contains the plans which show the location of the Project and proposed Marine Licence area(s)
3. Development Consent Order	Outlines the authorised development and any ancillary works as well as the legal powers sought by the Applicant to construct and maintain the Project
4. Compulsory Acquisition Information	Provides details of the powers of compulsory acquisition that are sought for the Project
5. Reports/ Statements	Contains documents required to be submitted with the DCO and Marine Licence application(s)
6. Environmental Impact Assessment	Contains information showing how the Applicant has assessed the potential impact on the environment of the Project
7. Additional information for specific types of infrastructure	Contains specified documents required to be submitted for an offshore wind farm for the purposes of a DCO, but included for context with this Marine Licence application
8. Other documents	Includes additional documents produced in support of the application
9. Examination submissions [to follow]	A placeholder for new documents submitted during the course of the Marine Licence application process.

41 The table below identifies the associated electronic files for the documents produced for submission. This is a live document and will be updated when updates or revisions to existing documents are made and new documents are submitted to NRW-MLT. The table identifies the category, document reference, title, submission date and version of the document. Columns will be added as necessary to indicate when the latest version was produced.

MASTER DOCUMENT LIST – SUBMISSIONS MADE TO NATURAL RESOURCES WALES MARINE LICENCING TEAM				
Reference	Document title	Submission	Version	For MLA?
Application Form				
1.1	DCO Application Letter	April 2022	A	
1.2	DCO Section 55 Checklist	April 2022	A	
1.3	Application Form (DCO)	May 2022	A	
	Application Form (ML)	May 2022	A	
1.4.1	Guide to the Marine Licence Application	May 2022	A	
1.5	Copies of Newspaper Notices	April 2022	A	
Plans				
2.1...X	Location Plan	May 2022	A	
2.2...	Land Plan (Offshore)	April 2022	A	
2.3...	Land Plan (Onshore)	April 2022	A	
2.4...	Special Category Land Plan	April 2022	A	
2.5...	Works Plan	April 2022	A	
2.6...	Street Works and Access Plan	April 2022	A	
2.7...	Temporary Stopping Up of Public Rights of Way Plan	April 2022	A	
2.8...	Statutory / Non-statutory Nature Conservation Sites Plan	April 2022	A	

2.9...	Statutory / Non-statutory Sites or Features or the Historic Environment Plan	April 2022	A	
2.10...	Crown Land Plan	April 2022	A	
2.11...	Water Bodies in a River Basin Management Plan	April 2022	A	
2.12...	Hedgerow and Protected Tree Plan	April 2022	A	
Development Consent Order				
3.1...	Draft Development Consent Order	April 2022	B	
3.2...	Explanatory Memorandum	April 2022	A	
3.3...	Draft Development Consent Order Validation Report	April 2022	A	
Compulsory acquisition information				
4.1...	Statement of Reasons	April 2022	A	
4.2...	Funding Statement	April 2022	A	
4.3...	Book of Reference	April 2022	A	
Reports/ Statements				
5.1...	Consultation Report	April 2022	A	
5.1.2..	Consultation Report Appendices - Part 2 (Appendices E to H)	April 2022	A	
5.2...	Report to Inform Appropriate Assessment	May 2022	B	

5.2.1..	RIAA Annex 1: HRA Screening Update (Non-Ornithology)	May 2022	A	
5.2.2..	RIAA Annex 2: HRA Screening Update (Ornithology)	May 2022	A	
5.2.3..	RIAA Annex 3: European Site Information	May 2022	A	
5.2.4..	RIAA Annex 4: Bottlenose Dolphin and Grey Seal Additional Information	May 2022	A	
5.2.5..	RIAA Annex 5: Ornithology Apportioning Note	May 2022	A	
5.2.6..	RIAA Annex 6: Screening Matrices	May 2022	A	
5.2.7..	RIAA Annex 7: Integrity Matrices	May 2022	A	
5.2.8..	RIAA Annex 8: Abundance and Distribution of Red Throated Diver in Gwynt y Môr Offshore Wind Farm and Wider Area	May 2022	A	
5.3...	Statutory Nuisance Statement	April 2022	A	
5.4...	Consents and Licences Required Under Other Legislation	May 2022	A	
5.4.1..	Marine Licence Principles	May 2022	C	
Environmental Statement (ES)				
6.7.1..	Non Technical Summary	May 2022	A	
6.7.2..	Non-Technical Summary (Welsh Language Version)	May 2022	A	

6.8.1..	Scoping Opinion	May 2022	A	
Volume 1 - Introductory Chapters				
6.1.1..	Volume 1, Chapter 1: Introduction	May 2022	B	
6.1.2..	Volume 1, Chapter 2: Policy and Legislation	May 2022	B	
6.1.3..	Volume 1, Chapter 3: Environmental Impact Assessment Methodology	May 2022	B	
6.1.4..	Volume 1, Chapter 4: Site Selection and Alternatives	May 2022	B	
6.1.3.1.	Volume 1, Annex 3.1: Cumulative Effects Assessment	May 2022	B	
6.1.3.2.	Volume 1, Annex 3.2: Transboundary Screening	May 2022	B	
6.1.4.1.	Volume 1, Annex 4.1: SSA Identification of Area of Search Report	May 2022	B	
6.1.4.2.	Volume 1, Annex 4.2: SSA Shortlisting Outcomes Report	May 2022	B	
Volume 2 – Offshore Chapters				
6.2.1..	Volume 2, Chapter 1: Offshore Project Description	May 2022	B	
6.2.2..	Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes	May 2022	B	

6.2.3..	Volume 2, Chapter 3: Marine Water and Sediment Quality	May 2022	B	
6.2.4..	Volume 2, Chapter 4: Offshore Ornithology	May 2022	B	
6.2.5..	Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology	May 2022	B	
6.2.6..	Volume 2, Chapter 6: Fish and Shellfish Ecology	May 2022	B	
6.2.7..	Volume 2, Chapter 7: Marine Mammals	May 2022	B	
6.2.8..	Volume 2, Chapter 8: Commercial Fisheries	May 2022	B	
6.2.9..	Volume 2, Chapter 9: Shipping and Navigation	May 2022	B	
6.2.10..	Volume 2, Chapter 10: Seascape, Landscape and Visual Impact Assessment	May 2022	B	
6.2.11..	Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage	May 2022	B	
6.2.12..	Volume 2, Chapter 12: Other Marine Users and Activities	May 2022	B	
6.2.13..	Volume 2, Chapter 13: Military and Civil Aviation	May 2022	B	
6.2.14..	Volume 2, Chapter 14: Inter-relationships	May 2022	B	
6.2.15..	Volume 2, Chapter 15: Offshore Conclusions	May 2022	B	

Volume 3 – Onshore Chapters				
6.3.1..	Volume 3, Chapter 1: Onshore Project Description	May 2022	B	
6.3.2..	Volume 3, Chapter 2: Landscape and Visual Impact Assessment	April 2022	B	
6.3.3..	Volume 3, Chapter 3: Socio-Economics	April 2022	B	
6.3.4..	Volume 3, Chapter 4: Tourism and Recreation	April 2022	B	
6.3.5..	Volume 3, Chapter 5: Onshore Biodiversity and Nature Conservation	May 2022	B	
6.3.6..	Volume 3, Chapter 6: Ground Conditions and Land Use	April 2022	B	
6.3.7..	Volume 3, Chapter 7: Hydrology, Hydrogeology and Flood Risk	April 2022	B	
6.3.8..	Volume 3, Chapter 8: Onshore Archaeology and Cultural Heritage	April 2022	B	
6.3.9..	Volume 3, Chapter 9: Traffic and Transport	April 2022	B	
6.3.10..	Volume 3, Chapter 10: Noise and Vibration	April 2022	B	
6.3.11..	Volume 3, Chapter 11: Air Quality	April 2022	B	

6.3.12..	Volume 3, Chapter 12: Public Health	April 2022	B	
6.3.13..	Volume 3, Chapter 13: Onshore Conclusions	April 2022	B	
Volume 4 – Offshore Annexes				
6.4.2.1.	Volume 4, Annex 2.1: Physical Processes Baseline Technical Report	May 2022	B	
6.4.2.2.	Volume 4, Annex 2.2: Physical Processes Model Calibration	May 2022	B	
6.4.2.3.	Volume 4, Annex 2.3: Physical Processes Modelling Results	May 2022	B	
6.4.2.4.1	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 1)	May 2022	B	
6.4.2.4.2	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 2)	May 2022	B	
6.4.2.4.3	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 3)	May 2022	B	
6.4.2.4.4	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 4)	May 2022	B	
6.4.2.4.5	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 5)	May 2022	B	

6.4.2.4.6	Volume 4, Annex 2.4: Seafloor and Shallow Geological Results (Array) (Part 6)	May 2022	B	
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6.6.10.5.42	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 69 (ViewPoint 42 - Mynydd Bodafon - Trig Point)	May 2022	B	
6.6.10.5.43	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 70 (ViewPoint 43 - Mynydd y Garn)	May 2022	B	
6.6.10.5.44	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 71 (ViewPoint 44 - Beaumaris Castle)	May 2022	B	
6.6.10.5.45	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 72 (ViewPoint 45 - Conwy Castle – Chapel Tower)	May 2022	B	
6.6.10.5.46	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 73 (ViewPoint 49 - Menai Suspension Bridge)	May 2022	B	
6.6.10.5.47	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 74 (ViewPoint 50 - Gwrych Castle – Terrace)	May 2022	B	
6.6.10.5.48	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 75	May 2022	B	

	(ViewPoint 52 - Pen-y-Dinas Camp at Interpretation Sign)			
6.6.10.5.49	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 76 (ViewPoint 53 - Puffin Island)	May 2022	B	
6.6.10.5.50	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 77 (ViewPoint 54 - y Foel (Common land and hill east of Dyserth))	May 2022	B	
6.6.10.5.51	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 78 (ViewPoint 55 - Footpath Above Cilgwyn Mawr)	May 2022	B	
6.6.10.5.52	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 79 (ViewPoint 56 - Pen-y-corddyn-mawr)	May 2022	B	
6.6.10.5.53	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 80 (ViewPoint 57 - Moelfre Isaf)	May 2022	B	
6.6.10.5.54	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 81 (ViewPoint 58 - Little Orme on the Wales Coast Path)	May 2022	B	
6.6.10.5.55	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 82 (ViewPoint 59 - Llandundo Promenade - Lifeboat Slipway)	May 2022	B	

6.6.10.5.56	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 83 (ViewPoint 60 - Foel Lus)	May 2022	B	
6.6.10.5.57	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 84 (ViewPoint 61 - Llandudno Promenade near Venue Cymru)	May 2022	B	
6.6.10.5.58	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 85 a-e (ViewPoint 62 -Great Orme – Marine Drive, Wales Coast Path near Toll Booth)	May 2022	B	
6.6.10.5.59	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 86 (ViewPoint 63 - A55 at Penmaenmawr)	May 2022	B	
6.6.10.5.60	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 87 (ViewPoint 64 - A55 at Puffin Roundabout, Dwygyfylch)	May 2022	B	
6.6.10.5.61	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 88 (ViewPoint 65 - A55 at jetty north of Penmaen Rhos)	May 2022	B	
6.6.10.5.62	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 89 (ViewPoint 66 - Liverpool to Dublin Ferry route north of Great Orme)	May 2022	A	
6.6.10.5.63	Volume 6, Annex 10.5: SLVIA Visualisations - Figure 90	May 2022	A	

	(ViewPoint 67 - Liverpool to Dublin Ferry route north of Conwy Bay)			
Other ES documents				
			B	
Additional information for specific types of infrastructure				
7.1...	Grid Connection and Cable Details Statement	May 2022	A	
7.2...	Safety Zone Statement	May 2022	A	
Other Documents				
8.1...	Planning Statement	April	A	
8.1.1..	Planning Statement Appendix 1: WTG Technical note	April	A	
8.1.2..	Planning Statement Appendix 2: Welsh National Marine Plan policy checklist	May 2022	A	
8.2.1..	Environmental Impact Assessment Evidence Plan (Appendices Part 1 of 2)	May 2022	A	
8.2.2..	Environmental Impact Assessment Evidence Plan (Appendices Part 2 of 2)	May 2022	A	
8.2...	Environmental Impact Assessment Evidence Plan Report	May 2022	A	

8.3...	Outline Offshore Archaeological Written Scheme of Investigation	May 2022	A	
8.4...	Outline Landscape and Ecological Management Plan	April	A	
8.5...	Fisheries Cooperation Strategy	May 2022	A	
8.7...	Outline Offshore Operations and Maintenance Plan	May 2022	A	
8.8...	Design Principles Document (onshore)	April	A	
8.9...	Disposal Site Characterisation	May 2022	A	
8.11...	Schedule of Mitigation	May 2022	B	
8.12...	Schedule of Monitoring	May 2022	B	
8.13...	Outline Code of Construction Practice (onshore)	April	B	
8.13.1..	Outline CoCP, Appendix 1, Outline Construction Method Statement	April	B	
8.13.2..	Outline CoCP, Appendix 2, Outline Noise and Vibration Management Plan	April	B	
8.13.3..	Outline CoCP, Appendix 3, Outline Air Quality Management Plan	April	B	
8.13.4..	Outline CoCP, Appendix 4, Outline Soil Management Plan	April	B	

8.13.5..	Outline CoCP, Appendix 5, Outline Site Waste Management Plan	April	B	
8.13.6..	Outline CoCP, Appendix 6, Outline Pollution Prevention and Emergency Incident Response Plan	April	B	
8.13.7..	Outline CoCP, Appendix 7, Outline Construction Traffic Management Plan	April	B	
8.13.8..	Outline CoCP, Appendix 8, Outline Public Access Management Plan	April	B	
8.13.9..	Outline CoCP, Appendix 9, Outline Travel Plan	April	B	
8.13.10..	Outline CoCP, Appendix 10, Outline Artificial Light and Emissions Plan	April	B	
8.13.11..	Outline CoCP, Appendix 11, Outline Invasive Non-Native Species Management Plan	April	B	
8.13.12..	Outline CoCP, Appendix 12, Outline Communication Plan	April	B	
8.16...	Welsh Community Linguistic Statement	April	A	

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

RWE Renewables UK Swindon Limited

Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB
T +44 (0)8456 720 090
[redacted]

Registered office:
RWE Renewables UK Swindon Limited
Windmill Hill Business Park
Whitehill Way
Swindon

Awel y Môr Offshore Wind Farm

ML-2.13_Awel y Môr Marine Licence Plan Areas Map

Date: May 2022

Revision: A

REVISION	DATE	STATUS/ REASON FOR ISSUE	AUTHOR:	CHECKED BY:	APPROVED BY:
A	May 2022	ML app	RWE	RWE	RWE

[redacted]

RWE Renewables UK
Swindon Limited

Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB
T +44 (0)8456 720 090
[redacted]

Registered office:
RWE Renewables UK
Swindon Limited
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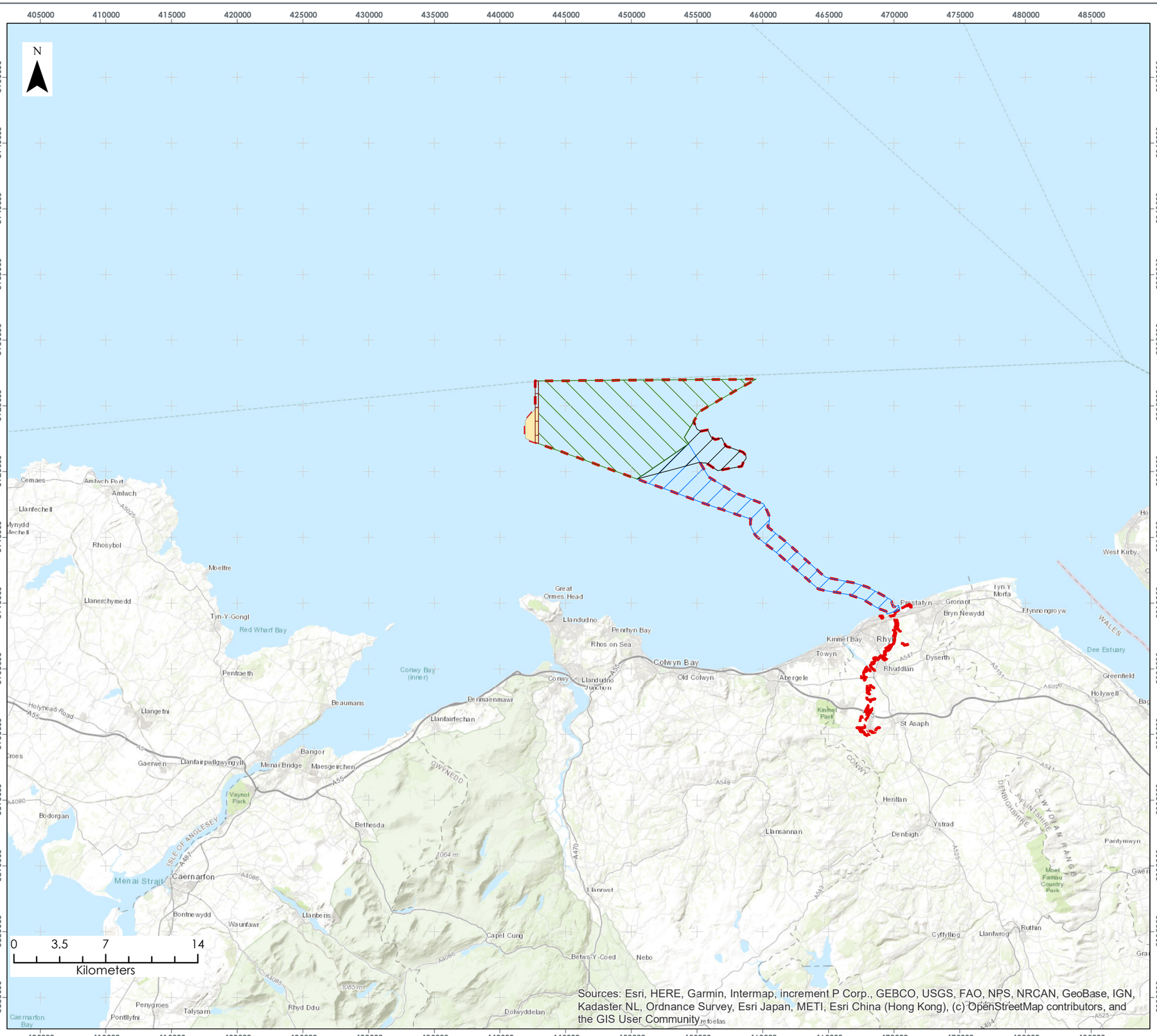

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

LEGEND

- Subsea Infrastructure and Temporary Works
- Other Wind Farm Infrastructure Zone
- Offshore Array
- GyM Interlink Area
- Export Cable Corridor
- DCO Order Limits

Data Source:

PROJECT TITLE:

AWEL Y MOR OFFSHORE WINDFARM

DRAWING TITLE:

Overview Map

VER	DATE	REMARKS	Drawn	Checked
3	27/05/2022	For Information	IC	PC

DRAWING NUMBER:

004364869-03

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:300,000	A3	WGS84	UTM30N

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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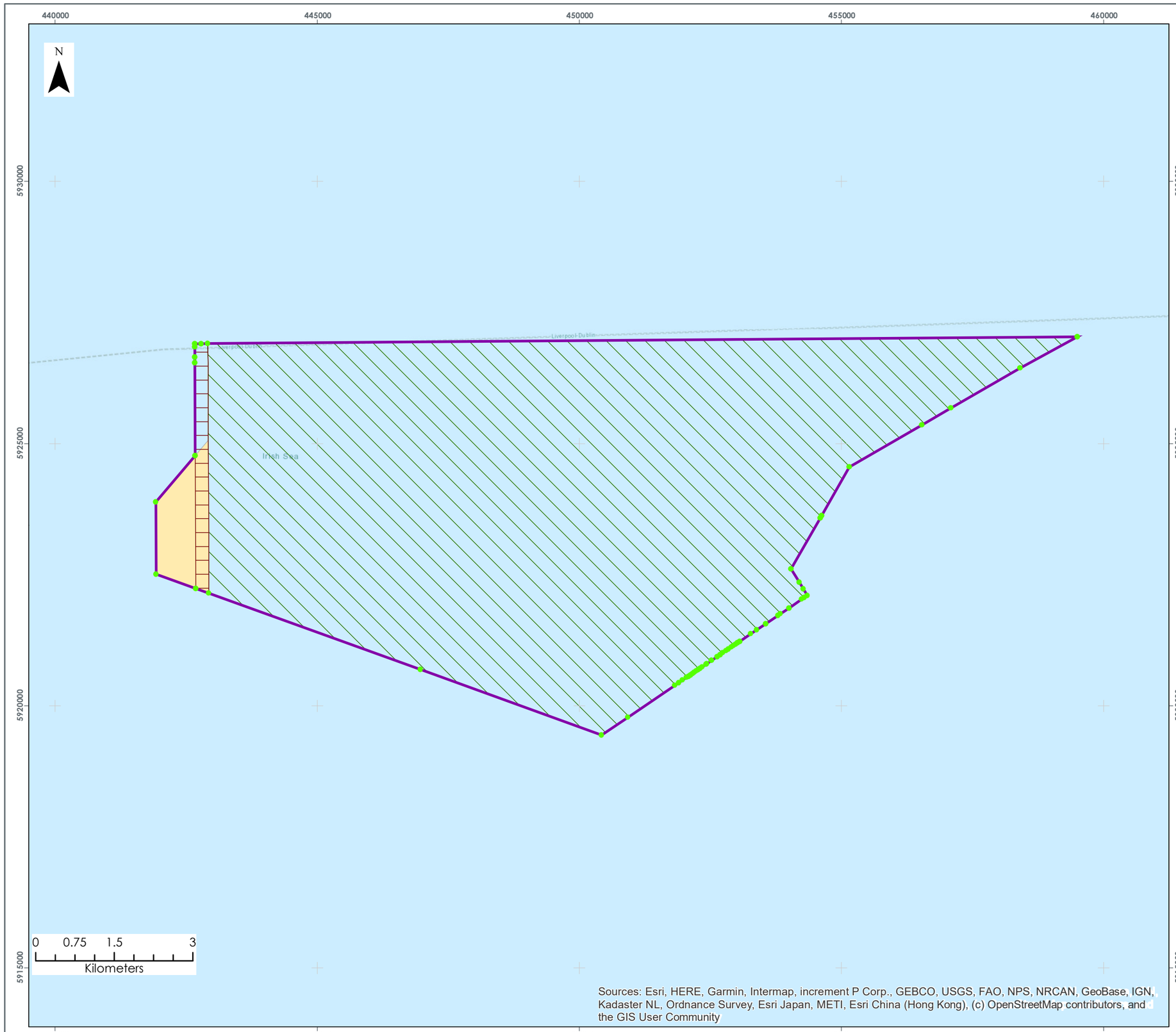

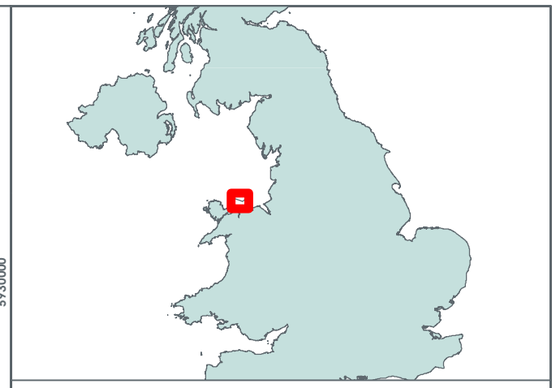

LEGEND

- AYM Generation Marine Licence Area Coordinates (see ML-2.13.1 Marine Licence Plan Coordinate list)
- AYM Generation Marine Licence Area
- Subsea Infrastructure and Temporary Works
- Other Wind Farm Infrastructure Zone
- Offshore Array

Data Source:

PROJECT TITLE:

AWEL Y MOR OFFSHORE WINDFARM

DRAWING TITLE:

Generation Marine Licence Plan

VER	DATE	REMARKS	Drawn	Checked
3	27/05/2022	For Information	IC	PC

DRAWING NUMBER:

004364869-03

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

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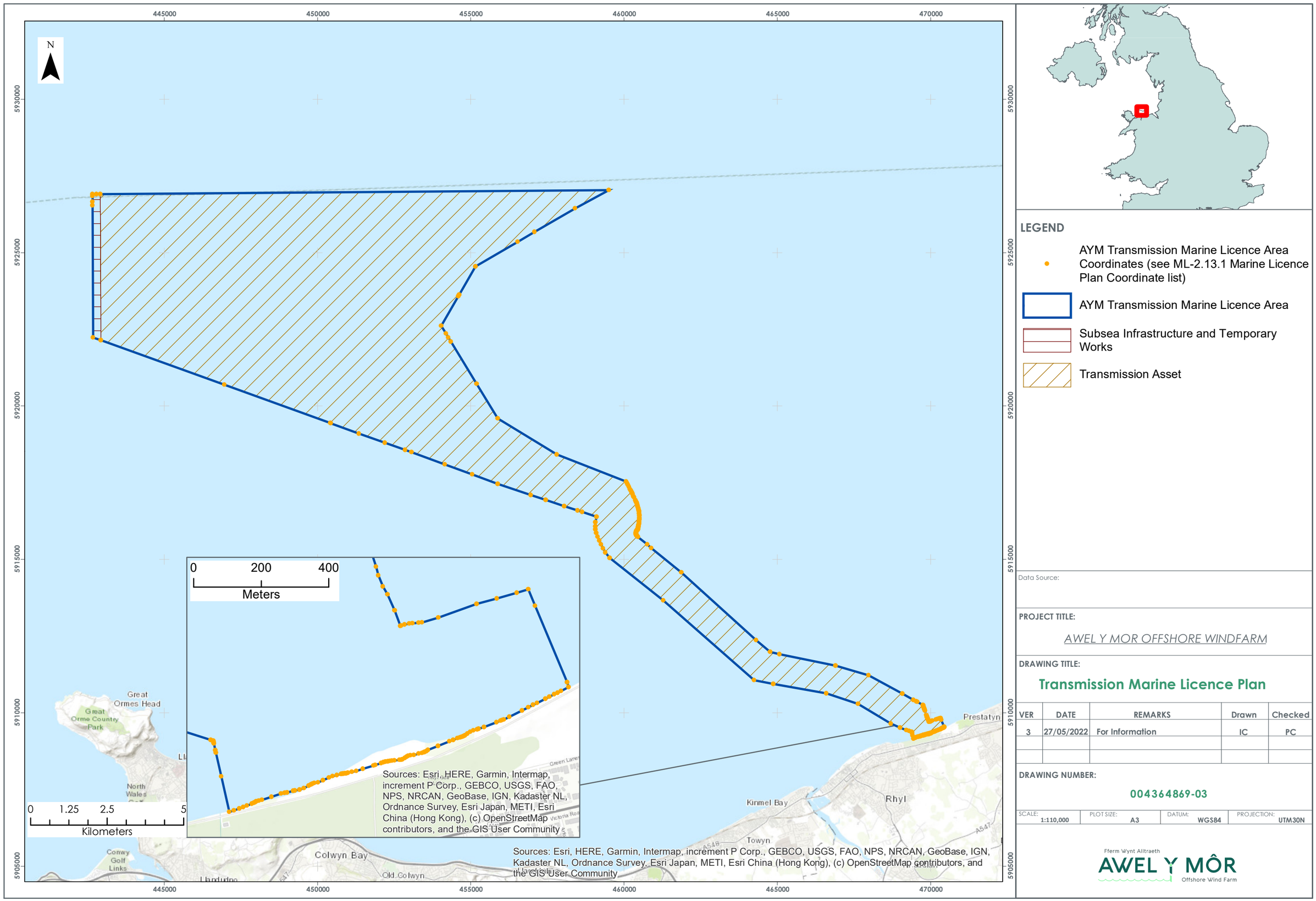

LEGEND

- AYM Transmission Marine Licence Area Coordinates (see ML-2.13.1 Marine Licence Plan Coordinate list)
- AYM Transmission Marine Licence Area
- Subsea Infrastructure and Temporary Works
- Transmission Asset

Data Source:

PROJECT TITLE:

AWEL Y MOR OFFSHORE WINDFARM

DRAWING TITLE:

Transmission Marine Licence Plan

VER	DATE	REMARKS	Drawn	Checked
3	27/05/2022	For Information	IC	PC

DRAWING NUMBER:

004364869-03

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

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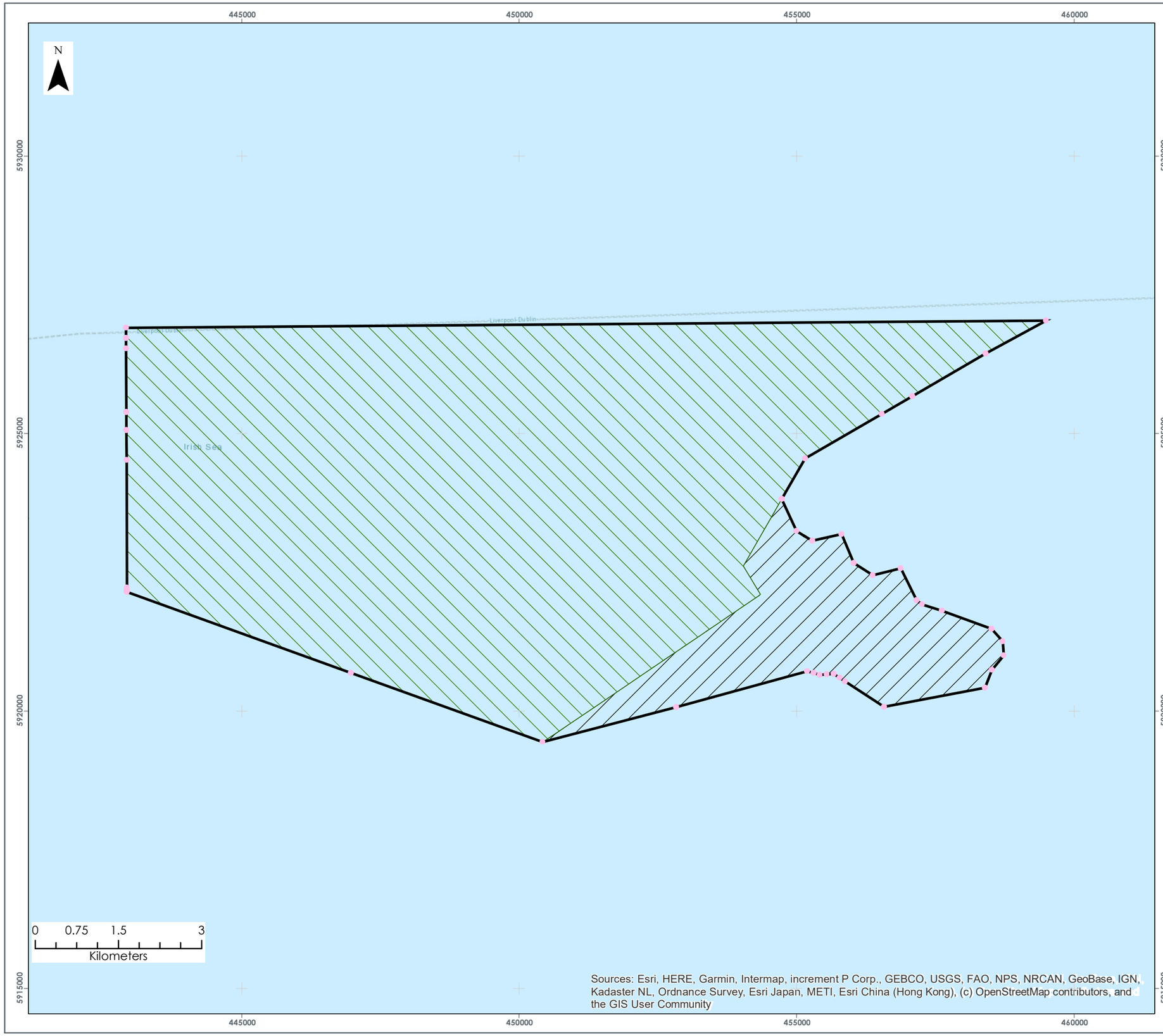

LEGEND

- AYM/GyM Interlink Marine Licence Area Coordinates (see ML-2.13.1 Marine Licence Plan Coordinate list)
- AYM/GyM Interlink Marine Licence Area
- Offshore Array
- GyM Interlink Area

Data Source:

PROJECT TITLE:

AWEL Y MOR OFFSHORE WINDFARM

DRAWING TITLE:

GyM Interlink Marine Licence Plan

VER	DATE	REMARKS	Drawn	Checked
3	27/05/2022	For Information	IC	PC

DRAWING NUMBER:

004364869-03

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

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Cyfoeth Naturiol Cymru
Natural Resources Wales

Ein cyf/Our ref: ORML2233

Ty Cambria / Cambria House
29 Heol Casnewydd / 29 Newport Road
Caerdydd / Cardiff

Ebost/Email: [redacted]

Sent by e mail

22 June 2022

Dear Consultee,

MARINE AND COASTAL ACCESS ACT 2009: PART 4 MARINE LICENSING

Awel y Môr offshore wind farm

The Natural Resources Wales Permitting Service (NRW PS) has received an application from Awel y Môr Offshore Wind Farm Limited, for a Marine Licence under Part 4 of the Marine and Coastal Access Act 2009, to undertake the above stated works.

A copy of the application and a list of documents submitted in support of the application is attached.

A copy of all application documents has been shared with you using our online fileshare system in the accompanying email. The documents are also available on our online public register [redacted]. You can search for the documents using the application reference number **ORML2233**.

I would be grateful for any views that you may have regarding the significance of these works taking into account the:

- protection of the environment,
- protection of human health,
- prevention of interference with other legitimate uses of the sea,
- protection of the local biodiversity,
- minimisation of noise and nuisance,
- potential impacts on navigation, such as obstruction or endangerment,
- need for any special lighting or markings,
- potential impacts on marine archaeology interests or sites.

Please assess the application over a calendar year to highlight any potential seasonal issues that could arise as a result of the proposal.

In accordance with our responsibilities under national and European legislation, your advice should also take into account the following provisions:

Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)
We are of the opinion that the proposed works fall under Schedule A2 paragraph 21 of the Regulations;

21. Installations for the harnessing of wind power for energy production (wind farms).

The project also requires a Development Consent Order from the Secretary of State under the Planning Act 2008. In accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 the Secretary of State must not make an Order granting development consent for EIA development unless an EIA has been carried out in respect of that application.

Under Reg 10(1)(b) of the Marine Works Regulations, NRW may determine that an EIA is not required, for the purposes of determining the Marine Licence application, if we are satisfied that an assessment of any effects on the environment of the project in question has already been, is being or is to be carried out, by another consenting authority and the assessment is or will be sufficient to meet the requirements of the EIA Directive in relation to that project.

Based upon the information received to date, in accordance with Regulation 10(1)(b) of the Marine Works Regulations , NRW intend to defer the EIA consent decision , on the basis that an assessment of any effects on the environment of the project in question is being / is to be carried out by the Secretary of State as part of the determination process for a Development Consent Order under the Planning Act and that this is, or will be, sufficient to meet the requirements of the EIA Directive.

Conservation of Habitats and Species Regulations 2017 – Regulation 63
The site of the proposed work lies within Liverpool Bay SPA an area designated as a European site of conservation importance under the provisions of the Conservation of Habitats and Species Regulations 2017.

The proposed works also has the potential to impact upon a number other European Designated Sites. The protected sites identified have been recorded and assessed within *Report 5.2: Report to Inform the Appropriate Assessment* and associated appendices submitted by the applicant.

I have consulted our internal statutory nature consultee for their views on whether the proposed work, alone or in combination with other projects, is likely to have a significant effect on the sites and/or on any European protected species and if an Appropriate Assessment of the implications for the sites and/or species having regard to their conservation objectives is necessary.

Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000
Under the Wildlife and Countryside Act 1981, Statutory Authorities are required to give notice to the Natural Resources Body for Wales (hereafter “Natural Resources Wales”) of

operations likely to damage any of the flora, fauna or geological or physiographical features by reason of which a site of special scientific interest (SSSI) is of special interest.

The offshore works within the marine licensable area is not within a SSSI.

Impact of the project on onshore SSSI have been considered within *Environmental Statement Volume 3, chapter 3.5: Onshore Biodiversity and Nature Conservation*. As such notice has been given to Natural Resources Wales.

Biodiversity Duty under the Environment (Wales) Act 2016
Under section 6 of the Environment (Wales) Act 2016 ('the 2016 Act'), a public authority in Wales must seek to maintain and enhance biodiversity in the exercise of its functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.

In complying with the duty under section 6 of the 2016 Act, a public authority must take account of the resilience of ecosystems, in particular—

(a) diversity between and within ecosystems;
(b) the connections between and within ecosystems;
(c) the scale of ecosystems;
(d) the condition of ecosystems (including their structure and functioning);
(e) the adaptability of ecosystems.

If you consider the proposed works will impact upon ecosystem(s), please advise NRW as to:

- the ecosystem(s) that you consider would be affected;
- how you consider that the ecosystem(s) would be affected; and,
- mitigation measures that would avoid adverse impacts to the ecosystem(s) identified.

In complying with the duty under section 6 of the 2016 Act, a public authority must also have regard to any list of the living organisms and types of habitat which in their opinion are of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales published by the Welsh Ministers under section 7 of the 2016 Act. The Welsh Ministers have published interim lists of habitats and species, for the purposes of section 7 of the 2016 Act, which are available from the Biodiversity Wales Partnership: [redacted]

If you consider the proposed works will impact upon listed species and / or habitat(s) listed under the 2016 Act, please advise NRW as to:

- any species and / or habitat listed under section 7 of the 2016 Act that you consider would be affected; and,
- mitigation measures that would avoid adverse impacts to the species and / or habitats identified.

Consultation Response Due

A response to this consultation letter is required within **42 days** of the date of this letter, this being **3 August 2022.** If I do not hear from you by this date I shall assume you have no comments to make.

Please send your response electronically where possible at [redacted]

Public Register
I would advise you that any information you provide in relation to the application is liable to be made available through our Public Register unless you specifically request otherwise.

Enquires
Should you wish to discuss any aspect of this application please do not hesitate to contact me quoting reference number: **ORML2233**.

Thank you for your assistance.

Yours faithfully

Peter Morrison
Marine Licensing Team
Permitting Services
Natural Resources Wales

Permit Receipt Centre
Natural Resources Wales
29 Newport Road
Cambria House
Cardiff
CF24 0TP
Tel: 0300 065 3000
Email: [redacted]

APPLICATION FOR A MARINE LICENCE FOR MARINE WORKS

Marine Works include, but are not limited to, coast defences, beneficial uses of dredged materials, subsea cables, pontoons, jetties, land reclamation, grab samples and outfall pipes under the Marine and Coastal Access Act 2009

Please read the notes carefully before completing the form.

- The Marine Licensing Team (MLT) administers Part 4 of the Marine and Coastal Access Act 2009 on behalf of the Licensing Authority, the Welsh Ministers.

- The completed application form must be accompanied by a location plan and, where appropriate, descriptive drawing(s) and any supporting environmental assessments. One completed hard copy of the application and supporting documents will always be required. Additional copies are required for consultation purposes.

  - For application and supporting documents less than 10MB we can accept an additional copy via email.
  - For applications larger than 10MB **16** additional copies in CD/DVD format will be required
  - When applications and supporting documents are hard copy only **16** copies will be required.

- Please submit applications to the **Permit Receipt Centre** via the details at the top of this form

- Please submit marine licence applications, including this form and all supporting documents, **at least 4 months before the licence is required.**

  Some projects may raise matters that require a significantly longer time for consideration. These are most likely to be:

  - Projects that fall **within** The Marine Works (Environmental Impact Assessment) Regulations 2007 – as amended requiring an Environmental Statement
  - Large scale projects with substantial volumes of material being deposited or excavated
  - Works requiring an Appropriate Assessment to be conducted under The Conservation of Habitats and Species Regulations 2017.

- Information should be provided about the anticipated **duration of the entire project** in respect of works below/seaward of Mean High Water Spring (MHWS). Where appropriate, planned phasing of the work for which consent is sought must be detailed. For projects lasting more than one calendar year, planned phasing details must be given for each 12 month period.

A licence fee is payable in respect of an application. Details of fees can be found on our web pages.

Please note applications will not be processed without the correct relevant fee or invoicing details.

- Payments can be made via Cheque, BACS or credit/debit card.
  - Cheques should be crossed and made payable to **Natural Resources Wales**.
  - For BACS payments ensure you provide the reference number (not remittance number)

- For credit/debit card payments please complete the CC1 form and submit with the application. The CC1 form can be found on our web pages

Further information on payment methods can be found on our web pages

- **All activities need to comply with the Water Framework Directive (WFD). The framework and guidance can be found on the Natural Resources Wales website, [redacted]. The results of your WFD assessment must be attached to your marine licence application.**

- Please answer all questions. If any information is not available at the time of application please indicate in the relevant section, giving reasoning in a covering letter. Outstanding details must be submitted as soon as possible. Any delay in forwarding details is likely to result in delays in determining your application.

  Your application may not be considered complete and therefore not processed until key information has been submitted. Your application may be returned if you fail to submit outstanding information within given timescales.

- Please note any licence may have conditions that must be discharged before works can commence. This will take additional time.
- If you have any queries with regards to completing this application please contact the MLT: marinelicensing@naturalresourceswales.gov.uk

How your application will be processed by the MLT:

- Submit all application to the **Permit Receipt Centre** via the details at the top of this form.

- Checked and acknowledged by the MLT within 21 days of receipt of application and payment

- If the application is complete and no further information is needed at this time, your application will be placed in a work queue to be assigned a permitting officer

- If the application is not complete, further information will be request and need to be provided before the application can be considered as complete

- Our **4 months** service level for determining non-EIA applications will begin from the date the **completed** application is received (*Please note some projects may take significantly longer than 4 months to determine due to their nature)*

- EIA projects may take significantly longer due to their scale and complexity. Therefore we encourage early engagement with the MLT

- Your application and supporting documents will be sent to for an initial consultation period of 28 days *(42 days for EIA projects)*

- For the majority of projects, a public notice must be advertised. Public consultation will be 28 days (*49 days for EIA projects*).
  For EIA projects a second public notice will be required. The MLT will advise on how this should be done.

- Responses to consultation will be considered and additional information requested at this time, if necessary.

- A decision on your Marine Licence Application will be made

All information submitted may be referred to within a licence, therefore all works must be in accordance with this information, unless otherwise agreed with NRW acting on behalf of the Licensing Authority during the determination process.

It is the responsibility of the applicant to obtain any other consents/authorisations that may be required.

Application Form Structure

1. Project Description and Cost
2. Applicant Details
3. Details of Agent, Contractor, Vehicles and/or Vessels used to carry out works
4. Environmental Impact Assessment (EIA)
5. Licensable Period
6. Project Description
7. Methods Statement
8. Materials of Project
9. Beach Replenishment, Land Reclamation or Salt Marsh Feeding
10. Temporary Works
11. Dredge and Disposal of Dredge Material
12. Protected Sites
13. Other Consents
14. Statutory Powers
15. Public Register
16. Application Fee
17. Declaration

Check List

Please ensure that you have included all the necessary information before you submit you application. **If any of the below are not completed in the application form, the application is likely to be considered incomplete and may be returned to you**

Item	Yes (√)
The applicant is a legal entity?	√
The declaration is signed by the applicant?	√
Is the application fee correct?	N/A
Are the grid references/coordinates correct?	√
Do the coordinates match map locations?	√
Have all the relevant supporting documents been submitted?	√
Has a clear methodology been provided in the application form?	√
Has Protected sites information been included?	√
Has a Water Framework Directive (WFD) assessment been submitted?	√
Are all the continuation sheets for application questions appended with correct corresponding numbers?	√

Should you have any queries regarding you application please contact the MLT via marinelicensing@naturalresourceswales.gov.uk

1. Project Description and Cost

1 (a). Project Name

Awel y Môr Offshore Wind Farm

1(b). Please provide a brief description of the proposed project, including location

Awel y Môr Offshore Wind Farm (AyM) is a proposed sister project to the operational Gwynt y Môr Offshore Wind Farm (GyM) off the north-east coast of Wales. AyM will comprise up to 50 WTGs and all associated infrastructure required to transmit the electricity generated to shore (and – under a Development Consent Order – on to the existing National Grid Bodelwyddan substation, as well as all infrastructure required to operate and maintain the wind farm.

The AyM array area lies approximately 10.5km off the north-east coast of Wales. The offshore Export Cable Corridor (ECC) extends from the south-western to south-eastern boundary of the array area in a south-easterly direction to meet land at Frith Beach between Rhyl and Prestatyn. Outside of the scope of this marine licence application, an onshore ECC extends from the landfall to the onshore substation west of St Asaph's Business Park (SABP) before connecting to the National Grid substation at Bodelwyddan (south of SABP).

1(c). Please provide an estimated gross cost of the project (Inc. materials and labour) for works that fall below/seaward of Mean High Water Springs (MHWS)

In excess of £1m.

2. Applicant Details

To whom the licence will be issued. *This must be a legal entity such as an individual, registered company/ charity or public body.*

Title	Mr	Full Name	Mark Legerton

Company or Trading Name	Awel y Môr Offshore Windfarm Ltd
Company Registration Number (if applicable)	12270928
Name of Contact or individual (if different)	Paul Carter
Position in Company	Senior Consents Manager
Address inc. postcode (provide registered Company address if applicable)	Windmill Hill Business Park, Whitehill Way, Swindon, Wiltshire, SN5 6PB
Telephone Number	[redacted]

Email Address	[redacted]

3. Details of Agent, Contractor, Vehicles and/or Vessels used to carry out works

3(a). Agent Details

This is who we will correspond with unless otherwise informed. If no agent we will contact the applicant.

Title		Full Name	
Company or Trading Name			
Company Registration Number (if applicable)			
Name of Contact or individual (if different)			
Position in Company			
Address (Inc. postcode)			
Telephone Number			
Email Address			

3(b). Does the Applicant wish to be included in all correspondence? Yes ☒No ☐

3(c). Contractor Details

In order for contractors to benefit from the licence permission, details must be provided. *Any details not provided with application must be confirmed before operations commence.*

Contractor Company or Trading Name	Address
To be provided before operations commence.	

3(d). Will the works require the use of vessels? Yes ☒No ☐

3(d) (i).Vessel Details (if applicable and available)
In order for contractors to benefit from the licence permission, details must be provided.
Any details not provided with application must be confirmed before operations commence.

Operator	Name of Vessel	Type of Vessel	Vessel Registration Number	Country of Registration
To be provided before operations commence.				

3(e). Will the works require the use of vehicle? Yes ☒No ☐

3(e) (i). Vehicle Details (if applicable and available) to be used below MHWS
In order for contractors to benefit from the licence permission, details must be provided.
Any details not provided with application must be confirmed before operations commence.

Operator	Type/Description of Vehicle
To be provided before operations commence.	

3(f). If the contractor or vessels or vehicles are not known at the application stage, when do you expect to provide these details?
These details will need to be confirmed prior to the licence and operations commencement

To be provided before operations commence.

4. Environmental Impact Assessment (EIA)

Certain projects, due to their scale, location and/or nature, may require an EIA under the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended). If a project qualifies under EIA, an Environmental Statement (ES) must be prepared and submitted with the application.

Projects that fall within Annex I of the Directive automatically require an EIA. Projects that fall within Annex II of the Directive are assessed on a case-by-case basis for the requirement for an EIA to be undertaken.

4(a). Do you consider the works to be under the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended)? Yes ☒No ☐

4(a) (i) If Yes, which Annex does the proposal fall under? Annex I☐ Annex II☒

4(a) (ii) Which number(s) within the Annex does the proposal relate to?

Annex II 3(i) *Energy Industry, installations for the harnessing of wind power for energy production (wind farms)*.

4(b). Have you applied for a screening or scoping opinion from the MLT under the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)? Yes ☐No ☒

4(b) (i). If Yes, please provide the reference number EIA Scoping undertaken by SoS

4(c). Has an Environmental Impact Assessment been undertaken? Yes ☒ No ☐

4(c)(i). If Yes, has an Environmental Statement been submitted to support this Marine Licence application? Yes ☒ No ☐

4(d). If an Environmental Impact Assessment has been undertaken, but an ES has not been submitted, please provide an explanation

N/A

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

5. Licensable Period

Determination of applications will be based on the works taking place during these dates. Please ensure you have included an adequate contingency period. If works are not completed by the Requested Licence Expiry Date you may be required to submit a new application. *Including a contingency period within your original application does not impact on Licence Fee*

Start Date Oct 2023 **Requested Licence Expiry Date** Dec 2065

*Please ensure you submit your application for a Marine Licence **at least 4 months** prior to the intended start date. Some projects, such as EIA projects, will take significantly longer to determine.*

6. Project Description

6(a). Please give a description of the proposed project.
This should include the purpose of the project, estimated timescales of construction and operation, and broken down by the phases of works, if applicable.
Details should include, but not be limited to, dimensions of project, quantity of material being deposited and removed.

AyM will comprise an array of offshore Wind Turbine Generators (WTGs) with an overall capacity greater than 350 Megawatts (MW), for the purpose of generating renewable energy. There will be up to 50 WTGs and all associated infrastructure required to transmit the electricity generated to shore, where it will then be transmitted to the existing National Grid Bodelwyddan substation. More detail (including matters listed above) is provided in the Offshore Project Description (application ref: 6.2.1).

To facilitate the construction, operation and administration of the project, the Applicant proposes that three marine licences (ML1 to ML3, each for construction, operation and maintenance, and decommissioning) are issued under this application as set out in the Marine Licence Principles document (application ref: 5.4.1, table 1), and the ML audit document (application ref: ML-6.2.1) and summarised below.

Pre-construction works, ML1-3 (document 6.2.1, section 1.6) to include:

- Geophysical and geotechnical surveys (section 1.6.1)
- Seabed preparation (section 1.6.2)
- Sandwave clearance (section 1.6.3)
- Unexploded ordnance clearance (section 1.6.4)
- Boulder clearance (section 1.6.5)
- Pre-lay grapnel run (section 1.6.6)

ML1: generation assets, to include:

- up to 50 wind turbine generators fixed to the seabed by a foundation;
- up to two offshore substation platforms (OSPs) each fixed to the seabed by a foundation (to be licensed under ML1 and ML2, but not duplicated, a maximum of two being authorised see the Marine Licence Principles document (application ref: 5.4.1, paras 3-6));
- one meteorological mast fixed to the seabed by a foundation;
- floating buoys;
- a network of subsea inter-array cables including cable crossings and cable protection;
- and in connection with the above such other works as may be necessary or expedient for the purposes of the Licenced Activities and which fall within the scope of the work assessed by the environmental statement including:
    - scour protection around the foundations of the offshore structures;
    - cable protection measures such as rock placement and the placement of rock and/or concrete mattresses, with or without frond devices;
    - dredging;
    - the removal of material from the seabed required for the construction of the Licenced Activities and the disposal of inert material of natural origin and/or dredged material within the Marine Licence areas produced during construction drilling, and seabed preparation for the installation of the foundations of the offshore structures or during seabed preparation for cable laying;
    - creation and use of temporary vessel laydown areas;
    - removal of static fishing equipment; and
    - lighting

ML2: transmission assets, to include:

- installation of up to two subsea cable circuits including cable ducts (if required) and cable crossings;
- up to two OSPs each fixed to the seabed by a foundation (to be licensed under ML1 and ML2, but not duplicated, a maximum of two being authorised see the Marine Licence Principles document (application ref: 5.4.1, paras 3-6));
- cofferdam works including piling and creation of pits for trenchless installation techniques; and

- in the intertidal area:
    - installation of up to two buried cable circuits including cable crossings, cable protection, cable ducts (if required), cofferdam works including piling, creation of pits for trenchless installation techniques, cable trenching works and removal and remediation of groynes
- and in connection with the above such other works as may be necessary or expedient for the purposes of the Licenced Activities and which fall within the scope of the work assessed by the environmental statement including:
    - scour protection around the foundations of the offshore structures;
    - cable protection measures such as rock placement and the placement of rock and/or concrete mattresses, with or without frond devices;
    - dredging;
    - the removal of material from the seabed required for the construction of the Licenced Activities and the disposal of inert material of natural origin and/or dredged material within the Marine Licence areas produced during construction drilling, and seabed preparation for cable laying;
    - creation and use of temporary vessel laydown areas;
    - removal of static fishing equipment;
    - lighting; and
    - erection of temporary cofferdams during construction

ML3: AyM/GyM interlink, to include:

- installation of subsea cables to the Gwynt y Môr offshore wind farm including alteration of existing scour protection and cable protection and cable crossings
- and in connection with the above such other works as may be necessary or expedient for the purposes of the Licenced Activities and which fall within the scope of the work assessed by the environmental statement including:
    - cable protection measures such as rock placement and the placement of rock and/or concrete mattresses, with or without frond devices;
    - dredging;
    - the removal of material from the seabed required for the construction of the Licenced Activities and the disposal of inert material of natural origin and/or dredged material within the Marine Licence areas produced during construction drilling, and seabed preparation for cable laying;
    - creation and use of temporary vessel laydown areas;
    - removal of static fishing equipment; and
    - lighting.

Assuming consents are received in 2023 and expire in 2065, this allows seven years for commencement of works (under the Development Consent Order), five years for construction, 25 years of operations and maintenance, and five years to decommission (total 42 years, hence 2023-2065).

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

6(b). Please detail the location of the proposed construction project.

This should be either Ordnance Survey National Grid Reference (i.e. AB 12345 67890) or Latitude and Longitude in decimal degrees to 4 decimal places (i.e. Lat 52.1234 Long -

4.1234), defining the extent of the project. **Please specify which coordinate system has been used.**

The AyM array area lies approximately 10.5km off the north-east coast of Wales. The offshore Export Cable Corridor (ECC) extends from the south-western to south-eastern boundary of the array area in a south-easterly direction to meet land at Frith Beach between Rhyl and Prestatyn. Detail is provided in the Offshore Project Description (application ref: 6.2.1).

Coordinates have been provided as Latitude and Longitude in decimal degrees to 4 decimal places. Please see the Marine Licence Plan Coordinate list (application ref: ML-2.13.1). Please also see the Marine Licence Plan Areas Map (application ref: ML-2.13) which contains the following drawings:

Overall area seaward of MHWS – drawing number 004364869-03
ML1: generation assets – drawing number 004364869-03
ML2: transmission assets – drawing number 004364869-03
ML3: AyM/GyM interlink – drawing number 004364869-03

Please continue on a separate sheet if necessary. Please tick if you have done this ☒

6(c). The following must be provided with the completed application form:

(i) a suitably scaled extract of an Ordnance Survey Map or Admiralty Chart with location of project, complete with **North Arrow** and **Scale**

(ii) construction plans and sectional drawings showing those proposed works below/seaward of MHWS, which should give details of the materials to be used (for beach replenishment the quantity, particle size and source of material to be deposited and deposit location is also required).

(iii) a descriptive schematic drawing and suitably scaled location plan which show the full extent of the project clearly in relation to the surrounding area and features.

Please list below **all supporting documents** that have been submitted with this application, including suitable documents/maps/drawing titles and reference numbers.

The following documents provide the detail required by points (i) to (iii) above:

- 2.1 Location Plan
- ML-2.13 Marine Licence plans
- 6.2.1 Offshore Project Description

A full list of application documents is provided in the Guide to the Marine Licence Application (document ref: ML-1.4.1) and the accompanying index.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

The applicant should note that these drawings/plans may be copied to others as part of the MLT's consultation procedures. If they are subject to copyright, it is the **responsibility of the applicant to obtain the necessary approvals to reproduce the documents and to submit up to 16 copies with the application.**

7. Methods Statement

7(a). Please provide a detailed method statement for the works

This must include methods for all works including temporary structures or deposits such as jetties, cofferdams, moorings or landing stages to be constructed seaward of MHWS.

Decisions on exact locations of infrastructure and the precise technologies and construction methods employed cannot be made at this stage of AyM's development process. Therefore, the project description sets out the main components and parameters of the project and the design envelope approach (the 'Rochdale Envelope') has been used to provide certainty that the final project as built will not exceed these parameters, while providing the necessary flexibility to accommodate further project refinement during the detailed design phase post-consent. This applies to: ML1 for generation assets; ML2 for transmission assets; and ML3 for Gwynt y Môr OWF connection works. See 6.2.1 Offshore Project Description paras 5 to 7 for more detail. Further:

Pre-construction works, ML1-3 (document 6.2.1, section 1.6) to include:

- Geophysical and geotechnical surveys (section 1.6.1)
- Seabed preparation (section 1.6.2)
- Sandwave clearance (section 1.6.3)
- Unexploded ordnance clearance (section 1.6.4) – UXO has been assessed in the ES but would be subject to separate marine licence as required
- Boulder clearance (section 1.6.5)
- Pre-lay grapnel run (section 1.6.6)

ML1: generation assets (document 6.2.1)

- Foundation options x7 (section 1.8.1, table 8, and section 1.8.3-5)
- Scour protection (section 1.8.2)
- WTGs (section 1.8.6)
- OSPs (section 1.8.7)
- Meteorological mast (section 1.8.8)
- Permanent vessel moorings (section 1.8.9)
- Array cables (section 1.8.10, para 110-115 and table 21)
- Cable protection of varying kinds (section 1.8.10, para 123-128 and table 23)
- Aids to navigation, colour, lighting & marking (section 1.8.11)
- O&M (section 1.10)
- Decommissioning (section 1.11)

ML2: transmission assets (document 6.2.1)

- Foundation options for OSP x6 (section 1.8.1, table 8, and section 1.8.3-5)
- Scour protection (section 1.8.2)
- OSPs (section 1.8.7)
- Offshore export cables (section 1.8.10, para 116-119 and table 22)

- Cable protection of varying kinds (section 1.8.10, para 123-128 and table 23)
- Cable crossings (section 1.8.10, para 129-131 and table 24)
- Landfall (section 1.9), including transition joint bay, trenchless techniques, open-cut installation
- O&M (section 1.10)
- Decommissioning (section 1.11)

ML3: AyM/GyM interlink (document 6.2.1)

- AyM/GyM interlink cable (section 1.8.10, para 120-122 and table 22)
- Cable protection of varying kinds (section 1.8.10, para 123-128 and table 23)
- O&M (section 1.10)
- Decommissioning (section 1.11)

See also: 8.7 Outline Offshore Operations & Maintenance Plan.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

7(b). Do you intend to undertake activities that could generate underwater noise?
This include piling, use of explosives, geophysical, acoustic deterrent devices and multibean echosounders. Yes ☒ No ☐

7(b) (i). If Yes, what type(s) of activities will be undertaken?

Please see:
6.2.1 Offshore Project Description (para 69)
6.4.6.2 Underwater Noise Technical Report

Pre-construction works (ML1-3, document 6.2.1, section 1.6) to include:

- Geophysical and geotechnical surveys (section 1.6.1)
- Seabed preparation (section 1.6.2)
- Sandwave clearance (section 1.6.3)
- Unexploded ordnance clearance (section 1.6.4) – UXO has been assessed in the ES but would be subject to separate marine licence as required
- Boulder clearance (section 1.6.5)
- Pre-lay grapnel run (section 1.6.6)

The construction of piled foundations would result in the greatest propagation of underwater noise and as such has been used as the 'worst case' in the maximum design scenario adopted for the Environmental Statement.

ML1: generation assets (document 6.2.1)

- Foundation options x7 (section 1.8.1, table 8, and section 1.8.3-5)
    - Including Acoustic Deterrent Devices (ADD) – see document 6.4.7.2, section 1.13
- Scour protection (section 1.8.2)
- WTGs (section 1.8.6)
- OSPs (section 1.8.7)
- O&M (section 1.10)

- Decommissioning (section 1.11)

ML2: transmission assets (document 6.2.1)
- Foundation options x6 (section 1.8.1, table 8, and section 1.8.3-5)
- Scour protection (section 1.8.2)
- OSPs (section 1.8.7)
- Landfall (section 1.9), including transition joint bay, trenchless techniques, open-cut installation
- O&M (section 1.10)
- Decommissioning (section 1.11)

ML3: AyM/GyM interlink (document 6.2.1)
- AyM/GyM interlink cable (section 1.8.10, para 120-122 and table 22)
- O&M (section 1.10)
- Decommissioning (section 1.11)

7(b) (ii). If Yes, approximately how many days will the activity be undertaken for?

From pre-construction surveys and works in 2024 and 2025 to construction beginning in 2026 until the site is fully operational by 2030. Please see document 6.2.1 Offshore Project Description.

If Yes, you will be required to complete an additional form that will be provided.

7(c). Please state the measures to be taken to:

(i) Minimise risk to the marine environment

Please see: 8.11 Schedule of Mitigation which also cross-refers to specific chapters from the Environmental Statement.

(ii) Prevent undue interference to others

Please see document 8.11 Schedule of Mitigation, plus:
6.2.8 Commercial Fisheries – see section 8.9
6.2.9 Shipping & Navigation – see section 9.9 to 9.12
6.2.12 Other Marine Users & Activities – see section 12.9
6.2.13 Military & Civil Aviation – see section 13.9 and 13.11.2
8.5 Fishing Liaison & Co-existence Plan – in its entirety

(iii) Maintain navigational safety, including marking and lighting of works

Please see document 8.11 Schedule of Mitigation, plus:
6.2.9 Shipping & Navigation – see section 9.9 to 9.12
6.4.9.1 Navigational Risk Assessment – see section 19 and 20

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

8. Materials of Project

8(a). Description of materials to be deposited seaward of MHWS (Please tick all that apply)

Timber	☐	Iron/Steel	☒	Concrete	☒	Biocides/other chemicals	☐
Silt	☒	Stone/Rock	☒	Gravel	☒	Plastic/Synthetics	☒
Sand	☒	Other	☒				

If other, please provide a description of materials.

Please see document 6.2.1 Offshore Project Description

ML1: generation assets

- Iron/steel such as piled foundations (section 1.8.3)
- Concrete such as gravity base structure (GBS) foundations or cable protection (section 1.8.5 or para 125)
- Silt such as GBS ballast (para 81)
- Stone/rock such as cable protection or scour protection (para 124)
- Gravel such as seabed preparation for GBS foundations (para 36)
- Plastic/synthetics such as Permanent Vessel Moorings (PVM), the outer layers of cable insulation or flow energy dissipation devices (para 107, 111, or para 126)
- Sand such as sandbags for scour protection or cable protection (para 58 or 127)
- For examples of oil and fluids, (para 90 and table 17)
- Cables are typically constructed with an inner core of copper or Aluminium (para 111).

ML2: transmission assets

- Iron/steel such as piled offshore substation platform (OSP) foundations (section 1.8.3)
- Concrete such as OSP GBS foundations or cable protection (section 1.8.5 or para 125)
- Silt such as GBS ballast (para 81)
- Stone/rock such as export cable protection or OSP scour protection (para 124)
- Gravel such as seabed preparation for OSP GBS foundations (para 36)
- Plastic/synthetics such as the outer layers of cable insulation or flow energy dissipation devices (para 117 or 126)
- Sand such as sandbags for scour protection or cable protection (para 58 or 127)
- For examples of oil and fluids in the OSP, (para 90 and table 17)
- Cables are typically constructed with an inner core of copper or Aluminium (para 117).

ML3: Gwynt y Môr OWF connection works

- Iron/steel such cable armour (section 1.8.10)
- Concrete such as cable protection (para 125)
- Stone/rock such as cable protection (para 124)
- Plastic/synthetics such as the outer layers of cable insulation or flow energy dissipation devices (para 111 or 126)
- Sand such as sandbags for cable protection (para 127)

- Cables are typically constructed with an inner core of copper or Aluminium (para 111).

8(b). Delivery method of materials to site

If sea delivery, please include details of vessels to be used with a chart of proposed route and transhipment area. If vehicle delivery, please provide the proposed access route.

Sea delivery. Details of vessels to be provided before commencement of works. Please see document 6.2.1 Offshore Project Description – para 27.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

8(c). Will the works involve removals seaward of MHWS? Yes ☒ No ☐

8(c) (i). Description of materials to be removed seaward of MHWS (Please tick all that apply)

Timber	☒	Iron/Steel	☐	Concrete	☒	Biocides/other chemicals	☐
Silt	☒	Stone/Rock	☒	Gravel	☒	Plastic/Synthetics	☐
Sand	☒	Other	☐				

8(c) (ii). Description of objects/materials to be removed seaward of MHWS

Including quantities to be removed.

Please see document 6.2.1 Offshore Project Description. Specific examples:

ML1, 2 & 3:

- Boulder clearance and a pre-lay grapnel run are typically used prior to cable installation to reduce the risk of cable installation issues. Additionally, some foundation types required seabed preparation prior to installation. As such, objects or materials may be removed from the seabed. These are typically *stone* or *rock* but if materials such as *timber* or *concrete* are identified then these may be removed. See section 1.6.2, 1.6.5 and 1.6.6.
- *Sand, silt* and *gravel* exist on the seafloor and may be removed or moved as part of sandwave clearance. See section 1.6.3.
- Decommissioning of the offshore wind farm (works as described in answer to question 8(a)). See document 6.2.1 Offshore Project Description section 1.11. Please also see document ML-XXX for a tabulated record of all project parameters to be deposited and/or removed subject to phase of works.

ML1: generation assets

- N/A except as above.

ML2: transmission assets

- *Timber* groynes on the beach will be temporarily removed to enable cable installation activities at landfall. These will then be replaced.
- Existing *concrete* waste material is present on the beach and may need to be removed to enable the landfall cable installation works.

ML3: Gwynt y Môr OWF connection works

- *Stone/rock* forming part of the existing GyM OSP cable protection may be removed to enable the cable connection works.

9. Beach Replenishment, Land Reclamation or Salt Marsh Feeding

For works involving any of the above, please provide the following information

9(a). Is the material to be deposited like for like to existing material? Yes ☐ No ☐

9(a)(i) If No for Beach Replenishment please provide justification why?

N/A

9(b). Description of material to be deposited

Please provide the grading specification of materials to be used, if using a range of grain sizes please state the percentage by weight passing. *If unsure, please refer to the Wentworth Scale*

N/A

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

9(c). Source of the material to be deposited

Including dredged or land based stating the origin of material

N/A

9(d). Has the material been chemically analysed? Yes ☐ No ☐

If material has been analysed, we may request this information to determine the application

9(d) (i) If Yes, is the analysis data been included with the application? Yes ☐ No ☐

10. Temporary Works

10(a). Will there be any temporary deposits below MHWS? Yes ☒ No ☐

This includes construction materials, removed objects/material, jetties or cofferdams

If **Yes**, please continue with section **10**

10(b). Please provide the location of temporary deposits

Please include a map/chart displaying the location of temporary deposits, if necessary.

Please see:
Document 6.2.1 Offshore Project Description

ML-2.13 Marine Licence plans (tempoprary deposits could be anywhere within the areas shown in the Marine Licence plans).

10(c). Description of temporary deposits

Please see document 6.2.1 Offshore Project Description for further information.
Examples of temporary deposits within the Marine Licence areas are:

- Wet storage of items such as anchors and cable (para 50).
- Excavation of trenches for cable installation. Material is typically deposited adjacent to the trench and these pits are subsequently backfilled with the same material (para 113).
- Excavation of pits (with material typically deposited adjacent to the pit) for cable joints or for trenchless exit pits. These pits are subsequently backfilled (para 132 and 148).
- Construction of cofferdams around trenchless exit pits, where required and feasible, to assist the trenchless installation work (para 148).

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

11. Dredge and Disposal of Dredge Material

If you are undertaking Dredge and Disposal activities please also complete the Dredge and Disposal application form and submit together.

11(a). Do you intend to apply for a marine licence to dispose of dredged material to sea as part of the works in this application? Yes ☒ No ☐

The planned approach is to include provision for disposal of dredged material within the array area of the proposed project. The application includes a dredge/disposal characterisation report which supports disposal of naturally occurring materials from within the proposed array area into the proposed array area disposal site (the boundary of which is anticipated to match). We would anticipate the designated disposal site reference number being referred to in each of the proposed marine licences. Should other areas (e.g. the export cable route) need to be designated, we would do so later.

Please see site characterisation report: DCO application ref: 8.9.

12. Protected Sites

Licensing Authorities have a duty to ensure that projects will **not have significant adverse environmental impact**, particularly on any designated **European Site of Conservation Importance** - **Special Areas of Conservation (SAC) and Special Protection Areas (SPA), listed under the Habitats Directive (Council Directive 92/42/EEC on the conservation of natural habitats and of wild fauna and flora).** In addition, it is Government Policy that Wetlands of International Importance (Ramsar sites) are also considered as European Sites. There is a duty to take reasonable steps to further the conservation and enhancement of nationally designated sites (Sites of Special Scientific Interest (SSSIs).

12(a). Have you had pre-application correspondence with NRW, its legacy bodies or Natural England? Yes ☒ No ☐

12(a)(i). If Yes, please provide copies of correspondence with application and state which team(s) you have contacted?

Extensive consultation with NRW as set out in document 5.1 Consultation Report (and appendices, 5.1.1 and 5.1.2).

12(b). Are any part of the works located *within* or *likely to affect* a designated conservation site? (SAC, SPA, SSSI or Ramsar) Yes ☐ No ☒

12(b)(i). If Yes, which designated site(s) may be affected?

Please see document 5.2, Report to Inform Appropriate Assessment and accompanying annexes (5.2.1 to 5.2.8).

12(c). Please provide a description of all mitigation measures proposed to avoid any impact on designated conservation sites.

Please see document 8.11 Schedule of Mitigation.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

12(d). If the works are not located *within* or *likely to affect* a designated conservation site, please indicate the approximate distance to the nearest designated conservation site.

Please see documents: 5.2 Report to Inform Appropriate Assessment and accompanying annexes (5.2.1 to 5.2.8) 2.8 Nature Conservation Plan

Please note that if the proposed works are in or within 2km of a European Site of Conservation Importance you will have to provide suitable mitigation measure to avoid any impact on designated conservation sites.

13. Other Consents

Please detail all consents that you have applied for or received for these works

Type of Consent	Applied for	To be applied for	Reference Number	Date of Issue and Expiry
Planning Permission under Town and County Planning Act 1990 – From Local Planning Authority (LPA)				
Name and Address of LPA for location of works	Denbighshire County Council, PO Box 62, Ruthin, LL15 9AZ			
Land Owners Consent such as The Crown Estate Consent	26 June 2020		None provided	Lease will be for 60 years
Port Authority or Local Harbour permissions				
Other NRW consents *such as Flood Defence or SSSI assent*				
Details of NRW consent				
Other consents *such as Transport and Works Act Order, Section 36 Electricity Act, grant/loan sanction*				
Details of other consents	Development Consent Order under the PA2008 via the Planning Inspectorate			
	20 Apr 2022		EN010112	
	Energy generation licence under Electricity Act 1989			
			None provided	In force from 28 Jan 2021

14. Statutory Powers

14(a). Does the applicant have statutory powers to consent any aspect of the project?

E.g. coast protection authority, dredging powers, statutory undertakers Yes ☒ No ☐

14(a)(i).If Yes, please give details and state the relevant legislation that gives these powers

Electricity Act 1989

15. Public Register

Under The Marine Licensing (Register of Licensing Information)(Wales) Regulations 2011 and the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended) , all information contained within or provided in support of this application will be placed on the Public Register unless NRW approve of the applicant's reasons for withholding all or part.

15. Is there any information contained within or provided in support of this application that you consider should NOT be included on the Public Register on the grounds that its disclosure:

15(a). Would be contrary to the interest of National Security? Yes ☐ No ☒

15(b). Would prejudice to an unreasonable degree you, or some other person's commercial interest of those of a third party? Yes ☒ No ☐

If **Yes** to either (a) or (b), please provide full justification as to why all or part of the information you have provided should be withheld

Document reference 6.4.12.1.1 is Annex B to document 6.4.12.1 (the main charter angling baseline report). It has been submitted (to both PINS and NRW-MLT) as a confidential annex as it provides the reader with the location of fishing marks targeted by charter angling vessel operators, and represents their intellectual property, which has been provided during consultation with the operators for confidential use. The document informs, but is not critical to the understanding of, the EIA and as such is provided to the regulatory authorities for information, but should not be provided for public consultation.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

16. Application Fee

16(a). What are the corresponding fee band for this application? Band 2 ☐ Band 3 ☒

16(b) Band 2 Only
Projects are charged at a fixed fee of £1920. The application will not be processed until the correct fee has been provided.

Please provide the method of payment

Method	Yes (√)	Reference Number
Cheque	N/A	
BACS (not remittance no.)	N/A	
World Pay (phone or CC1)	N/A	

16(c) Band 3 Application only
Band 3 applications are charged at on hourly rate of £120 and are invoiced in arrears. Please complete the details below which will be required for invoicing.

Customer Name	Awel y Môr Offshore Windfarm Ltd
FAO	Paul Carter
Purchase order number	4200062874
Address for invoice	Awel y Môr Offshore Windfarm Ltd, Accounts Payable, Zentraler Rechnungseingang, D-45096 Essen
Telephone Number	[redacted]
Email Address	[redacted]

17. Declaration

I declare that to the best of my knowledge and belief that the information given in this application form and supporting documentation is true.

WARNING: It is an offence under the Marine and Coastal Access Act 2009, under which this application is made, to fail to disclose information or to provide false or misleading information and can invalidate any licence granted.

Signature _____ **Date** _____

Name *(in capitals)* *MARK LEGERTON*

Position in Company **Director**

*Applications cannot be processed unless signed by the **Applicant** (not agent), the applicant must have appropriate level of authority within the company.*

Applications will not be processed unless signed