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Morlais Project
Environmental Statement

Chapter 1: Introduction

Volume I

Applicant: Menter Môn Morlais Limited

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Chapter 1: Introduction

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GLOSSARY OF ABBREVIATIONS

AEMP	Adaptive Environmental Management Plan
B&V	Black and Veatch Limited
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FEED	Front-End Engineering Design
GW	Gigawatt
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
IEMA	Institute of Environmental Management and Assessment
IoACC	Isle of Anglesey County Council
ITPE	ITP Energised
MDZ	Morlais Demonstration Zone
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
NRW	Natural Resources Wales
NTS	Non-Technical Summary
ODA	Onshore Development Area
OfDA	Offshore Development Area
PDE	Project Design Envelope
TEC	Tidal Energy Converter
TEL	Tidal Energy Limited
TLP	Tidal Lagoon Power Ltd
TWAO	Transport and Works Act
UK	United Kingdom
WADZ	West Anglesey Demonstration Zone

1. INTRODUCTION

1.1. THE PURPOSE OF THIS DOCUMENT

1. This document is the Environmental Statement (ES) for the proposed Morlais Project (the Project). The Project is being developed by Menter Môn Morlais Limited (hereafter referred to as Menter Môn), the applicant, a not for profit social enterprise company. The Project will have a generating capacity of up to 240 MW of tidal generating capacity within the Morlais Demonstration Zone (MDZ).

2. Menter Môn has contracted Royal HaskoningDHV to undertake the Environmental Impact Assessment (EIA) for the Project. A full project description for the Project is provided in **Chapter 4, Project Description**.

3. The purpose of this ES is to document the assessment of potential significant environmental impacts resulting from the Project and to demonstrate that this assessment is robust and comprehensive. This ES highlights the key environmental issues associated with the Project and provides an unbiased assessment of their effects and their relative significance. This process has ensured that these effects are fully considered and where appropriate, mitigation has been integrated into the design of the Project.

4. This ES describes the findings of the assessment of the potential environmental impacts associated with the construction, operation, maintenance, repowering and decommissioning of the Project, including the onshore and offshore infrastructure.

5. This ES is produced in support of an application for a Marine Licence under the Marine and Coastal Access Act 2009 and a Transport and Works Act Order (TWAO) with deemed planning permission under the Transport and Works Act 1992 for the Project. **Chapter 2, Policy and Legislation** provides further detail on the requirements of each permission.

1.2. BACKGROUND

6. The Project is located within one of several marine energy demonstration zones located around the United Kingdom (UK) coast, which have been leased out by The Crown Estate in a bid to encourage and accelerate the marine energy industry. Each of the zones were identified because they offer appropriate marine energy potential and access to necessary infrastructure, including ports and electricity grid. Environmental considerations were used in the process of determining the zone locations. The marine energy demonstration zones were incorporated into a plan level Habitats Regulations Assessment (HRA) before the leasing process was finalised and seabed agreements signed (ABPmer, 2014). The Project is located within the West Anglesey Demonstration Zone (WADZ), a zone primarily selected for its tidal resource.

7. Menter Môn Cyf (which established Menter Môn Morlais Limited as a Special Purpose Vehicle (SPV) for the development of the Project) has been appointed as the manager of the WADZ by The Crown Estate; however, Menter Môn Cyf fulfils an enabling role for the Project and does not act as a technology developer. For simplicity, no distinction between Menter Môn Cyf and Menter Môn Morlais Limited is made from this point in the ES. In this ES, the WADZ is referred to as the MDZ.

8. Two scoping reports were previously submitted to Natural Resources Wales (NRW), the Marine Management Organisation (MMO) and the Isle of Anglesey County Council (IoACC) in support of earlier (lower capacity) versions of the Project. However, since those reports were submitted the proposed installed capacity of the Project has been increased in response to industry demand and the project is now seeking consent for up to 240 MW capacity.

9. A further request for scoping opinion, for the current 240 MW capacity Project, was submitted to the Welsh Government and NRW in April 2018, superseding the earlier scoping requests. The Welsh Government and NRW provided a detailed scoping opinion, which has been the starting point for consultation on the project. Consultation with the Welsh Government and NRW has been ongoing throughout the EIA to discuss developments in the Project, scope and design parameters, and to agree methodologies and approaches used for environmental surveys and assessments during the EIA process (see **Chapter 6, Consultation**).

1.2.1. Need for the Project and Potential Benefits

10. Climate change is a global issue as a result of carbon emissions released into the atmosphere due to human activity. Generating and harnessing energy from low carbon, renewable sources such as tidal energy is one of the solutions available to substantially reduce carbon emissions, whilst answering the challenges of meeting energy demand as part of a balanced energy portfolio. The UK has an ambitious target of reducing greenhouse gas emissions by 57 % relative to 1990 levels by 2030, and by 80 % by 2050. In 2018, more than 50 % of the UK's electricity was generated by low carbon sources (Imperial College London, 2019). Targets for CO_2 reduction and the use of renewable energy sources are discussed further in **Chapter 2, Policy and Legislation**.

11. In its 2010 Energy Policy Statement, the Welsh Government set out aspirations to reach 22.5 Gigawatt (GW) of installed capacity from renewable energy technologies in Wales by 2020/25 (Welsh Assembly Government, 2010). The Environment (Wales) Act 2016 requires Welsh Government to reduce greenhouse gas emissions in Wales by at least 80 % by the year 2050. Since the passing of the Environment (Wales) Act, guided by the Well-Being of Future Generations Act 2015, the Welsh Government has set targets and provided additional support for renewable energy.

12. In March 2019, the Welsh Government published a new Low Carbon Plan, which aims to reach targets to deliver clean growth, protect the environment and ensure a healthier society for future generations (Welsh Government, 2019). The Environment (Wales) Act 2016 requires Welsh Ministers to set five yearly carbon budgets and the Low Carbon Plan details how Wales aims to meet the first carbon budget (2016 to 2020), with the second carbon budget to be published in 2021. Achieving a low carbon pathway for Wales ensures maximisation of the seven national well-being goals and the Welsh Government's well-being objectives. The Project would present a significant proportion of the Welsh carbon budgets (further detail on renewable energy policy is presented in **Chapter 2, Policy and Legislation**).

13. The Welsh Government is currently developing the first marine plan for Welsh inshore and offshore waters, the Welsh National Marine Plan (WNMP). A draft version has been issued for consultation with the aim of publishing the document in summer 2019. The draft Welsh National Marine Plan also sets out support for marine renewable energy generation where the

development of technologies, proposals for renewable energy generation and collaboration between sectors to understand the opportunities for renewable energy are encouraged. Full details of the draft WNMP are set out in **Chapter 2, Policy and Legislation**, and although not yet implemented consideration is given to the WNMP in each marine technical chapter (**Chapters 7** to **16**).

14. Tidal energy is a clean, renewable and highly predictable source of energy. The European Union (EU) has identified tidal energy, and more widely ocean energy (tidal and wave combined), as having the potential to contribute significantly to climate change reduction, socio-economic and energy security objectives. In 2014, the European Commission presented its action plan for achieving the potential for 'blue energy' by 2020 and beyond, aimed at facilitating the further development of the renewable ocean energy sector in Europe.

15. The Project, allowing long-term commercial demonstration of different technologies and small arrays of tidal devices, is an important step in developing the tidal energy industry within the UK and internationally, with significant potential socio-economic benefits (see **Chapter 25, Socioeconomics, Tourism and Recreation**) as well as contributing towards the reduction of greenhouse gas emissions and greater security of energy supply.

1.2.2. Morlais Objectives – Meeting Local Needs

16. Menter Môn's objectives for the Project are detailed in **Section 1.2.5** below. Key is local economic growth, including the potential for job creation. The design of much of the Project infrastructure will be undertaken with a view to maximising local content and developing locally based skills, with social value (including sub-contracts) an important consideration in the procurement strategy. During development of the procurement strategy, efforts will be made to identify local suppliers and contractors who could undertake each contract.

1.2.3. UK Tidal Resource

17. It is estimated that the UK has approximately 50 % of Europe's tidal energy resource (Department for Business, Energy and Industrial Strategy, 2013). Wave and tidal stream energy has the potential to meet up to 20 % of the UK's electricity demand, representing a 30 to 50 GW potential installed capacity (Department for Business, Energy and Industrial Strategy, 2013). However, the number of sites with sufficient tidal velocity to allow commercial exploitation is limited, with the MDZ being located within an area of high resource. The tidal resource in the MDZ is presented in **Chapter 7, Metocean Conditions and Physical Processes**.

1.2.4. The Project

18. Development of the MDZ is being led by Menter Môn who have been allocated funding from EU Structural Funds prioritised for marine energy in Wales.

19. The development of the Project will provide a consented tidal technology demonstration zone, specifically designed for the installation and commercial demonstration of multiple arrays of tidal energy devices. The Project will include permanent communal infrastructure for tidal technology developers which provides a shared route to a local grid connection via up to nine export cable tails, an onshore landfall substation at Ty Mawr, and an onshore electrical cable route to a grid connection substation at Orthios via a switchgear building at Parc Cybi.

20. The consented footprint of the Project will also include a design envelope for tidal devices for which the deployment is allowed under the consent, and the key parameters of which will encompass a range of currently available tidal devices, as well as seeking to anticipate the parameters of future technology.

21. Development of the Project will support those objectives of the 2017 Anglesey and Gwynedd Joint Local Development Plan, aimed at promoting the development of renewable or low carbon energy technologies (Isle of Anglesey County Council and Gwynedd Council, 2017). The Project will prioritise maximising opportunities for local communities directly via employment and indirectly via the establishment of a local supply chain.

22. The Project will have an installed capacity of up to 240 MW, enough to provide electricity to the equivalent of over 188,000[1] homes.

23. The Project will provide the supporting electrical infrastructure to connect tidal energy converters (TECs) within the MDZ and export the electricity generated to grid. The Project aims to secure a broad consent envelope, which will encompass a range of tidal device types and technologies with the potential to be installed and operated as part of the Project. The final details of all equipment to be installed, including tidal devices, will be confirmed following consent.

24. The EIA assesses the potential significant environmental impacts for the following project elements, during the construction, operation and maintenance, repowering and decommissioning phases of the Project life cycle (see **Chapter 4, Project Description**):

- **Offshore Development Area**
  - Tidal devices, incorporating:
    - Foundations or anchors;
    - TECs;
    - Supporting structures holding TECs in place in the water and connecting to foundations or anchors; and
    - Seabed preparation for foundations and anchors if necessary.
  - Possible use of electrical hubs or connectors as a way of connecting electrical cables from multiple tidal devices to electrical export cables;
    - Inter-array cables and cable protection;
    - Export cables and cable protection;
- **Onshore Development Area**
  - Landfall works including transition pits;

[1]Calculated taking the number of installed megawatts (240 MW) multiplied by the number of hours in one year (8,766 hours), multiplied by an expected load factor for tidal stream (35 %), divided by the average household energy consumption (3,900 kWhr), giving an equivalent of 188,806 homes.

- Landfall substation at Ty Mawr (hereafter referred to as the Landfall Substation);
- Cable installation from landfall to Landfall Substation;
- Switchgear building at Parc Cybi (hereafter referred to as the Switchgear Building);
- Grid connection substation at Orthios (hereafter referred to as the Grid Connection Substation);
- Cable installation from Landfall Substation to Grid Connection Substation, via the Switchgear Building, including cable junction pits;
- Temporary road and right of way closures;

- Temporary laydown and construction areas, including fencing / walls, and accommodation;
- Levelling works; and
- Parking areas (including electric vehicle charging points) and site access.

25. The infrastructure outlined above will be located within two development areas, as follows:

- Offshore Development Area (OfDA): including all intertidal and offshore areas where offshore infrastructure may be placed and encompassing the MDZ and the export cable corridor. The Offshore Development Area is shown in **Figure 1-1 (Volume II)**; and
- Onshore Development Area (ODA): including all intertidal and onshore areas where onshore infrastructure may be placed. The Onshore Development Area is shown in **Figure 1-2 (Volume II)**.

26. From the arrays of tidal devices, electricity will flow via subsea inter-array cables to an offshore hub or other connection point(s), from where subsea export cables will connect to export cable tails in the nearshore, with the export cable tails continuing to landfall.

27. On reaching shore the export cable tails will be joined to underground onshore cables via an underground transition pit, near to the point of landfall. The onshore underground cables will connect to a landfall substation, and from that substation, will connect via underground onshore cables and a switchgear building to a grid connection substation and grid connection.

28. A Front-End Engineering Design (FEED) study was undertaken by ITP Energised (ITPE) on behalf of Menter Môn in 2018, to provide the proposed design of the project necessary to inform the EIA project description for consent (**Appendix 4.1, Volume III**). Further to a revision of proposed installed project capacity to 240 MW, an addendum to the study was undertaken for the offshore infrastructure elements (**Appendix 4.2, Volume III**) by ITPE. In parallel, Black and Veatch Ltd. (B&V) have been responsible for further design of, and updates to, the onshore infrastructure within the ODA.

29. As a pre-consented and grid connected commercial demonstration zone, a number of different tidal devices and array configurations may be deployed at the Project over its anticipated 37-year lifetime, including construction and operation. The types of devices that have been used to define the Project Design Envelope (PDE) for the project are discussed in **Chapter 4, Project Description**.

1.2.5. The Developer

30. The Project's developer and the applicant for consent is Menter Môn. Menter Môn is a not for profit, third sector social enterprise, delivering socioeconomic development projects across North Wales. Menter Môn's motivation for the Project is to position itself as a community agency at the centre of renewable innovation, and to establish Anglesey as a marine energy hub, thereby securing maximum added value for the local economy and community.

31. Menter Môn has identified the following Project objectives;

- Generation of long-term financial income / resources for reinvestment in socio-economic and environmental projects to support the wider community;
- Development of locally based skills;
- Attracting investment to the area;
- Becoming a centre of excellence for tidal stream technologies;
- Providing a world class facility for tidal technology development;
- Preserving the environment; and
- Securing a sustainable energy supply for the area.

1.3. STRUCTURE OF THE ENVIRONMENTAL STATEMENT

32. The ES comprises three volumes:

- Volume 1: ES chapters (chapter list shown in **Table 1-1**);
- Volume 2: Figures; and
- Volume 3: Appendices.

33. A standalone Non-Technical Summary (NTS) is available which summarises the key characteristics of the Project and the findings contained within the ES.

Table 1-1 Structure of the Environmental Statement

Chapter Number	Title
1	Introduction
2	Policy and Legislation
3	Site Selection and Consideration of Alternatives
4	Project Description
5	EIA Methodology
6	Consultation
7	Metocean Conditions and Coastal Processes
8	Marine Water and Sediment Quality
9	Benthic and Intertidal Ecology
10	Fish and Shellfish Ecology
11	Offshore Ornithology
12	Marine Mammals

Chapter Number	Title
13	Offshore Archaeology and Cultural Heritage
14	Commercial Fisheries
15	Shipping and Navigation
16	Infrastructure and Other Users
17	Water Resources and Flood Risk
18	Ground Conditions and Contamination
19	Onshore Ecology
20	Onshore Archaeology and Cultural Heritage
21	Noise and Vibration
22	Air Quality
23	Traffic and Transport
24	Seascape, Landscape and Visual Assessment
25	Socio-Economics, Tourism and Recreation
26	Cumulative Impacts and In-Combination Effects
27	Summary

1.4. KEY PROJECT TERMINOLOGY

34. The terminology presented in **Table 1-2** is used throughout the ES when describing the Project.

Table 1-2 Morlais Project Terminology

Applicant	Menter Môn Morlais Limited.
Array	A group of tidal devices connected to each other and to a common export cable.
Array Area	The area taken up by an array, including spaces between devices.
Array Export Cable	Export cable connecting an array of tidal devices to an export cable tail, and from there to grid via permanent infrastructure.
Berth	Discrete area of the Morlais Demonstration Zone identified for a specific tenant's array project demonstration.
Cable Protection	Protective materials strategically placed on sections of the export cable, export cable tails and inter-array cables, to hold them in place.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Cumulative effects	The combined effect of the Morlais Project in combination with the effects from a number of projects, on the same single receptor / resource.
Cumulative impact	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Morlais Project.
Device Area	Plan view surface area occupied by a tidal device.
Device Type	A grouping of tidal devices, with similar characteristics. For example, grouping on the basis of the nature of the Tidal Energy Converter (TEC) technology or grouping on the basis of the location and scale of the tidal device during operation, without consideration of the type of TEC deployed.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.

Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an EIA Report.
Export Cables	Up to nine lengths of cable from arrays within the Morlais Demonstration Zone (MDZ), connected to the export cable tails.
Export Cable Corridor	The corridor within which the export cables and export cable tails will be routed from the Morlais Demonstration Zone site to the landfall location at Abraham's Bosom.
Export Cable Tails	Up to nine lengths of cable installed from the transition pit in the landfall area, to a point in the nearshore offshore seabed via Horizontal Directional Drilling (HDD) or trenching.
Footprint	The surface area of a tidal device that is in physical contact with the seabed.
Grid Connection Substation	Grid connection substation at Orthios.
Horizontal Directional Drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Hub	Electrical infrastructure used to connect two or more tidal devices within an array.
Inter-Array Cables	Offshore cables which link the arrays to each other and the offshore electrical platforms, these cables will include fibre optic cables.
Joint Pits	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into buried ducts within the road.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land and connect to the onshore cables.
Landfall Substation	Landfall substation at Ty-Mawr.
Morlais Demonstration Zone (MDZ)	Defined by The Crown Estate Lease boundary, the area within which the tidal devices/arrays will be deployed along with associated infrastructure such as inter-array cables, export cables, marker buoys, site monitoring equipment and electrical connections to the export cables. An offshore area of 35km^2 within which the Project will deploy arrays of tidal devices and associated infrastructure.
Offshore Development Area (OfDA)	The combined area of the Morlais Demonstration Zone and the Export Cable Corridor.
Offshore Infrastructure	All offshore infrastructure including tidal devices, foundations or anchors, inter array cables, hubs, export cables, export cable tails and cable protection.
Onshore cables	The cables which take the electricity from the landfall transition pit to the grid connection substation.
Onshore Cable Corridor	The area within which the onshore cables and associated infrastructure such as joint bays, will be located.
Onshore Development Area (ODA)	The area including the intertidal landfall location at Abraham's Bosom, the short onshore cable route between landfall and the landfall substation infrastructure (up to and including landfall substation/control room), and the onshore cable route to the grid connection substation. This area is larger than the order limits proposed within the Transport and Works Act Order.
Project Design Envelope (PDE)	The parameters within which the potential maximum extent of the project in terms of materials, scale, time and location can be described. Sometimes referred to as the 'Rochdale envelope'.
Repowering	The removal of a tenant's infrastructure at the end of a demonstration period and replacement with new tenant infrastructure.

Safety Zones	A marine area declared for the purposes of safety around a renewable energy, installation or works / construction area under the Energy Act 2004, the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007 and Transport and Works Act Order.
Substation	A compound containing electrical equipment to enable connection to the existing electricity network. This also contains equipment to help maintain stable grid voltage.
Subzone	A part of the Morlais Demonstration Zone, within which defined types of tidal device may be deployed.
Swept Area	The cross-sectional area of the Tidal Energy Convertor perpendicular to the current flow.
Switchgear Building	Switchgear building at Parc Cybi.
Tenant / developer	A company or organisation which reaches agreement with Menter Môn to deploy tidal devices within the Morlais Demonstration Zone.
Tenant infrastructure	Tidal devices, hubs, inter array cables, cable protection, monitoring platforms / buoys and marker buoys.
Tidal Device	One complete unit including: Tidal Energy Convertor(s) (i.e. rotors and nacelle), foundations, support structure.
Tidal Energy Convertor (TEC)	A device that convert kinetic and potential energy contained within moving tidal water into electricity.
Transition Pit	Underground structures at the landfall and grid connection substation that house the joints between trenched and trenchless export cable sections.
Under-keel clearance	The vertical distance between the deepest underwater point of a vessels hull and the shallowest point of seabed or of an underwater structure.
Visually prominent	A tidal device where the large proportion of the support structure is visible above the water to the extent it is visually prominent, together with ancillary elements such as navigation lights, railings and mast

1.5. EIA PROJECT TEAM

35. Royal HaskoningDHV, in collaboration with MarineSpace, has been commissioned to undertake the EIA, providing consenting and licensing support to Menter Môn.

36. Royal HaskoningDHV has extensive experience in renewable energy EIA and a detailed understanding of the potential impacts of wave and tidal devices, having taken the lead EIA role for the following projects: the SeaGen project, Strangford Lough (tidal); the Kyle Rhea array project (tidal), the Sound of Islay (tidal) array project, the Lewis array (wave) project; and Perpetuus Tidal Energy Centre (tidal). As a company, Royal HaskoningDHV is an accredited member of the Institute for Environmental Management and Assessment (IEMA) and registrant of the EIA Quality Mark, which provides a benchmark for EIA activities and allows demonstration of commitment to effective practice. Royal HaskoningDHV has used in-house experts in the following areas to compile this ES: terrestrial archaeology; hydrology; geology; water quality; coastal processes; terrestrial ecology; marine mammals; ornithology; air quality; traffic and transport and onshore noise.

37. MarineSpace is a specialist marine consultancy and has supported a range of projects including providing consultancy support to Tidal Energy Limited (TEL) on its Ramsey and St David's Head projects and consenting support to Tidal Lagoon Power Ltd (TLP) in developing the Adaptive Environmental Management Plan (AEMP) for the Swansea Bay Tidal Lagoon project. MarineSpace has used in-house experts in the following areas to compile this ES; benthic and intertidal ecology, fish ecology and fisheries, marine archaeology, and navigation.

38. External expertise has been sourced from the following subcontractors:

- Partrac Limited – geophysical survey;
- BSG Ecology – ecological survey;
- Ocean Ecology Limited – benthic survey;
- Wessex Archaeology – terrestrial archaeological survey and desk-based assessment;
- Marico Marine – navigational risk assessment and navigation survey;
- Anatec – navigation survey;
- Aquaterra – socio-economics, tourism and recreation impact assessment;
- Axiom Traffic Ltd. – road traffic survey;
- Wynns Ltd. – Abnormal Indivisible Load; and
- SLR Consulting, with support from Hepla – seascape and landscape visual impact assessment.

39. Public consultation support and management of the public consultation record has been provided by Ateb.

1.7. REFERENCES

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