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Morlais Project
Environmental Statement

Chapter 16: Marine Infrastructures and Other Users

Volume I

Applicant: Menter Môn Morlais Limited

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Chapter 16: Marine Infrastructures and Other Users

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MarineSpace
Making Sense of the Marine Environment ™

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GLOSSARY OF ABBREVIATIONS

ADCP	Acoustic Doppler Current Profiler
AfL	Area for Lease
ALARP	As Low As Reasonably Practicable
BT	British Telecommunications
DECC	Department of Energy and Climate Change
EIA	Environment Impact Assessment
ES	Environmental Statement
ESCA	European Subsea Cables Association
ICPC	International Cable Protection Committee
GBS	Gravity Base Structure
HRA	Habitats Regulation Assessment
HDD	Horizontal Directional Drilling
JLDP	Joint Local Development Plan
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MCT	Marine Current Turbines
MPS	Marine Policy Statement
MOD	Ministry of Defence
MATZ	Military Aerodrome Traffic Zone
MDZ	Morlais Demonstration Zone
NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
PEXA	Practice and Exercise Area
RAF	Royal Air Force
ROV	Remotely Operated Vehicle
SO	Scoping Opinion
SR	Scoping Report
SoS	Secretary of State
TAN	Technical Advice Notes
TEC	Tidal Energy Converter
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordinance
WNMP	Welsh National Marine Plan

GLOSSARY OF TERMINOLOGY

Unexploded Ordnance	Explosive weapons (bombs, shells, grenades, land mines, naval mines, cluster munition, etc.) that did not explode when they were employed and still pose a risk of detonation
Aggregate dredging	The dredging of sand or gravel from the marine environment for use in construction and civil engineering projects

16. MARINE INFRASTRUCTURE AND OTHER USERS

16.1. INTRODUCTION

1. Menter Môn Morlais Limited (Menter Môn) proposes the development of 240 MW of tidal generating capacity within the Morlais Demonstration Zone (MDZ). The development of the Morlais Project (the Project) will support the development of renewable energy technology objectives of the Anglesey and Gwynedd Joint Local Development Plan (JLDP), providing a consented tidal technology commercial demonstration zone which supports installation, testing and commercial demonstrations of tidal energy devices. The Project will also provide opportunities for the local communities via direct employment and support of the local supply chain (see **Chapter 25, Socioeconomics, Tourism and Recreation**).

2. The Project will include permanent communal infrastructure for tidal technology developers which provides a shared route to a local grid connection via nine export cable tails, an onshore Landfall Substation, and an onshore electrical cable route to a grid connection via a Switchgear Building and Grid Connection Substation.

3. The purpose of this chapter is to provide an assessment of possible impacts which may arise through the development of the project on marine infrastructure and other seabed users. This chapter describes the baseline environment, identifies potential impacts which may arise during the construction, operation and maintenance (O&M), repowering and decommissioning phases of the project and their related receptors. An impact assessment and associated results are presented, and where applicable proposes mitigation measures.

4. The Project will install multiple technology types within the MDZ, and so the consent application is based on a Project Design Envelope (also known as the Rochdale Envelope), determined through knowledge of existing technology and the direction of future developments. Hence, the potential effects on Marine Infrastructure and Other Users have been assessed conservatively using realistic ‘worst case’ scenarios for the Project.

5. This chapter has been prepared by MarineSpace Ltd on behalf of Menter Môn.

16.2. POLICY, LEGISLATION AND GUIDANCE

16.2.1. Overview

6. A full overview of the relevant policy and legislative context for the Project is provided in **Chapter 2, Policy and Legislation**.

7. The Project is seeking consent for a Transport and Works Act Order from the Welsh Government and a Marine Licence from NRW. Due to its size (240 MW), The Project is representative of a Nationally Significant Infrastructure Project (NSIP). Guidance that is relevant to assessing impacts on marine infrastructure and other users from NSIPs are set out within Overarching National Policy Statements (NPSs) which are the principal decision-making documents for NSIPs. Those relevant to marine infrastructure and other users include:

    - Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a); and

- NPS for Renewable Energy Infrastructure (EN-3), July 2011;

8. Details of specific policies within EN-1 and EN-3 used to inform this assessment are provided in **Table 16-1** below. The specific assessment requirements for marine infrastructure and other users are detailed, together with an indication of the paragraph numbers of the chapter where each is addressed.

Table 16-1 NPS EN-1 and EN-3 Assessment Requirements Relevant to Marine Infrastructure and Other Users

NPS Requirement	NPS Reference	ES Reference
'… the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs."	EN-3, Paragraph 2.6.179	The potential impacts of the Project are assessed in **Section 16.6**.
"Applicants should establish stakeholder engagement with interested parties in the offshore sector in the development phase (of the proposed OWF[1]), with an aim to resolve as many issues as possible prior to the submission of an application. Such stakeholder engagement should continue throughout the life of the development."	EN-3, Paragraph 2.6.180	Consultation undertaken for the Project and to inform this chapter is detailed in **Section 16.3**
"Where a wind farm potentially affects other offshore infrastructure or activity, a pragmatic approach should be employed by the Secretary of State (SoS). The SoS should expect the applicant to minimise negative impacts and reduce risks to as low as reasonably practicable;"	EN-3 Paragraph 2.6.183	Mitigation measures are proposed **Section 16.6** for each identified impact.
"The SoS should be satisfied that site selection and site design of the OWF has been made with a view to avoiding or minimising disruption or economic loss or any adverse effects on safety to other offshore industries;"	EN-3, Paragraph 2.6.184	The site selection process is detailed in **Chapter 3, Site Selection**.
"The SoS should not consent applications, which pose unacceptable risks to safety after mitigation measures have been considered"	EN-3, Paragraph 2.6.184	The residual impacts, following the implementation of mitigation measures are presented in **Section 16.7**, **Table 16-9**.
"Where schemes have been carefully designed and the necessary consultation has been undertaken at an early stage, mitigation measures may be found that can negate or reduce effects on other offshore infrastructure or operations to a level sufficient to enable the SoS to grant consent."	EN-3, Paragraph 2.6.186	Consultation undertaken to inform this chapter is presented in **Section 16.3** and mitigation measures are proposed throughout **Section 16.6**.

[1] Although EN-3 predominantly references OWF developments, relevant policies are listed here as they are also relevant to a tidal energy development of this scale.

9. Other industry standard guidance relevant to this chapter includes:

- International Cable Protection Committee (ICPC) recommendations, October 2017; and
- European Subsea Cables Association (ESCA) recommendations.

10. In addition to the above, the following relevant legislation has also been considered within this chapter:

- Convention on the International Regulations for Preventing Collisions at Sea 1972;
- The Marine and Coastal Access Act 2009; and
- The Merchant Shipping and Fishing Vessels (Control of Noise at Work) Regulations 2007.

16.2.2. Welsh National Marine Plan (WNMP)

11. The Welsh Government is currently developing the first marine plan for Welsh inshore and offshore waters, the WNMP. The Plan is being developed in accordance with the Marine and Coastal Access Act (MCAA) 2009, the Marine Policy Statement (MPS) and the Maritime Spatial Planning Directive, a draft version has been issued for consultation (discussed further in **Chapter 2, Policy and Legislation**).

12. **Table 16-1** presents relevant policies of the draft WNMP of relevance to the Project.

Table 16-2 Draft WNMP Policies Relevant to Infrastructure and Other Users

Policy Description	Reference	ES Reference
Draft WNMP		
Proposals that consider opportunities for coexistence with other compatible sectors are encouraged in order to optimise the value and use of the marine area and marine natural resources	ECON_02: Coexistence	Cumulative effects are assessed in **Section 16.6.7** and in **Chapter 26, Cumulative and In-combination**
Proposals should demonstrate that they have assessed potential cumulative effects and, in order of preference: a) avoid adverse effects; and/or b) minimise effects where they cannot be avoided; and/or c) mitigate effects where they cannot be minimised. If significant adverse effects cannot be adequately addressed, proposals should present a clear and convincing justification for proceeding. Proposals that contribute to positive cumulative effects are encouraged.	GOV_01: Cumulative effects	

16.2.3. Planning Policy Wales

13. Planning policy for Wales is set out in the document Planning Policy Wales (Welsh Government, 2016). The planning policy document outlines the Welsh Government's approach to facilitating the delivery of the aims set out in Energy Wales: A Low Carbon Transition (Welsh Government, 2012b), as well as UK wide and European renewable energy targets, including obligations under the Renewable Energy Directive (2009/28/EEC).

14. The following Planning Policy Technical Advice Notes (TAN) have been reviewed within this chapter of the Morlais Environmental Impact Assessment (EIA):

- TAN 5: Nature Conservation and Planning; and
- TAN 8: Planning for Renewable Energy.

16.2.4. The Well Being of Future Generations (Wales) Act 2015

15. The Wellbeing of Future Generations (Wales) Act 2015 is used to improve the social, economic, environmental and cultural well-being of Wales. The Wellbeing of Future Generations (Wales) Act 2015 places a statutory duty on public bodies in relation to sustainable development, based on seven well-being goals (see **Chapter 2, Policy and Legislation**).

16. Climate change is integral to the wellbeing goals, which recognise that the case for action on climate change is clear and fundamental to future prosperity and the future resilience of communities (**Table 16-3**). The Wellbeing of Future Generations (Wales) Act 2015 provides a mechanism for public bodies to set targets and report progress against indicators. Through its well-being objectives, the Wellbeing of Future Generations (Wales) Act 2015 sets a clear agenda for sustainable development.

Table 16-3 Well-Being Goals and Adherence by the Project

Well-being Goal	Description	How is this addressed by the Project
A prosperous Wales	An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.	If built, the Project would have a design life of approximately 35 years, after which it may be either decommissioned or repowered (subject to separate consenting). During its operation the project would contribute to reaching global, European and national targets on CO_2 reduction and renewable energy production. It is estimated that the Morlais project could produce enough electricity each year to power the equivalent of 188,000 houses. Further information on tidal energy is provided in **Chapter 1, Introduction**.
A resilient Wales	A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).	The Morlais ES details the considerations of the project on the baseline environment for a number of key receptors. A habitats regulations assessment (HRA) has been compiled to determine whether the Project has the potential to have an adverse effect on the integrity and features of a Natura 2000 site. Where appropriate, mitigation measures are provided to ensure that no residual significant impacts are caused by the Project. The technical chapters (**Chapters 7** to **26**) outline any legislation which is specific to the relevant receptors.

Well-being Goal	Description	How is this addressed by the Project
		The Information to Support the HRA is provided in **Document MOR/RHDHV/DOC/0067.**
A globally responsible Wales.	A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.	The Project seeks to provide a platform for commercial tidal energy device development, the first of this scale in the world. Evidencing the projects importance, the development phase of the project has been supported by the European Regional Development Fund.

16.2.5. Regional Plans

16.2.5.1. Anglesey and Gwynedd Joint Local Development Plan (JLDP)

17. Development of the Project will support those objectives of the 2017 Anglesey and Gwynedd JLDP, aimed at promoting the development of renewable or low carbon energy technologies. The project will prioritise maximising opportunities for local communities directly via employment and indirectly via the establishment of a local supply chain.

18. Of the policies contained in the JLDP, those presented in **Table 16-4** below are considered to be of relevance to the proposed development.

Table 16-4 Relevant Policies of the Anglesey and Gwynedd JLDP

Policy	Description	Where considered within the ES
Policy ADN 3: Other Renewable Energy and Low Carbon Technologies	Proposals for renewable and low carbon energy technologies, other than wind or solar, which contribute a low carbon future will be permitted, provided that the proposal conforms to certain criteria	**Chapters 7 to 27** present the assessments of impacts from the Project on all receptors

16.2.1. Industry Guidance

19. Industry guidance on the generic requirements, including spatial and temporal scales, for infrastructure and other marine users studies associated with tidal array developments is provided in several documents (some of which are specifically written for offshore wind farms but are also of relevance here):

- General advice on assessing potential impacts of and mitigation for human activities on Marine Conservation Zone (MCZ) features, using existing regulation and legislation' (JNCC & Natural England, 2011); and
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects' (Cefas, 2011).

16.3. CONSULTATION

20. **Table 16-5** presents the relevant consultees responses on offshore infrastructure and other marine users.

Table 16-5 Consultation Responses

Consultee	Date/Document	Comment	Response
IACC 2017	2018 Scoping	The Applicant's SR indicates that the following topics can be scoped out: - MOD Operations - Aviation Whilst general aviation may be scoped out, the potential for impact on MOD operations, described as limited in nature during onshore infrastructure construction and no offshore impacts in the SO, remains a potential and should be fully considered in the ES.	MOD operations are considered with **Section 16.5.1.3** of this chapter.
NRW	2018 Scoping	We currently have no comments to make on this topic, but coordinates (lat & long co-ordinates for offshore and easting & northing for onshore) should be provided of the locations of the tidal array and cable route (inc sub-station etc) as the project is refined and develops.	Project coordinates are provided in **Chapter 4, Project Description**.

16.4. METHODOLOGY

16.4.1. Study Area

21. The marine infrastructure and other users study area encompasses the MDZ and Export Cable Corridor (ECC) and a wider region reflecting the potential for the Project and associated engineering works to widely affect other users. The extent of the study area is shown in **Figure 16-1** (**Volume II**) and consists of the offshore region between Bardsey Island at the southern extent and Prestatyn as the eastern extent.

16.4.2. Data Sources – Desk Study

22. A comprehensive review of available information was conducted to support the regional characterisation. The resources from which detail was extracted include, but were not limited to:

- Wales Marine Planning Portal;
- Consultation responses (see **Table 16-5**);
- The Crown Estate conflict check data; and
- Deep Green Holyhead Deep Project Phase I (0.5 MW) Environmental Statement (ES) (Minesto, 2018)

16.4.3. Data Sources – Site-Specific Surveys and Reports

23. Project-specific marine traffic surveys were undertaken as part of this EIA. The data and assessment related to these surveys are presented in **Chapter 15, Shipping and Navigation**.

16.4.4. Impact Assessment Methodology

24. **Chapter 5, EIA Methodology** outlines the full EIA Methodology which is used to assess the impacts to infrastructure and other marine users in this chapter.

25. The impact assessment considers the potential for impacts during the construction, operation and maintenance, and decommissioning phases of the Project.

26. Impacts are classified as follows:

- Direct impacts: these may arise from impacts associated with the construction, operation and maintenance, or decommissioning of the Project;
- Indirect impacts: these may be experienced by a receptor that is removed (e.g. in space or time) from the direct impact;
- Inter-relationships between impacts; or
- Cumulative impacts: these may occur as a result of the project in conjunction with other existing or planned projects within the study area for each receptor.

27. For each effect, the assessment identifies receptors within the study area that are sensitive to that effect and implements a systematic approach to understand the impact pathways and the level of impacts on given receptors. The process considers the following:

- The sensitivity of a receptor to the effect;
- The probability that an effect-receptor interaction will occur;
- The magnitude of the effect;
- The determination and (where possible) qualification of the level of impact on a receptor, considering the probability that the effect-receptor interaction will occur, the spatial and temporal extents of the interaction and the significance of the resulting impact; and
- The level of certainty at all stages.

28. By combining the magnitude of the impact and the sensitivity of the receptor in a matrix (see **Table 16-6**), the final significance of the impact (prior to the implementation of mitigation measures) can be obtained.

Table 16-6 Impact Assessment Matrix

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

16.5. EXISTING ENVIRONMENT

29. The characterisation of the existing environment has been undertaken using data sources listed in the **Section 16.4** above.

16.5.1. Regional Context

16.5.1.1. Renewable Energy Developments

30. Approximately 1 km to the west of the MDZ sits the Deep Green Holyhead Deep Project site, owned by Minesto UK Ltd. In June 2014, the project was granted an Agreement for Lease (AfL) by The Crown Estate for a 10 MW installation, a subsequent EIA was delivered for the project in 2016 and a Marine Licence was awarded by Natural Resources Wales (NRW) in April 2017. The Deep Green Holyhead Deep project is planned to be completed in phases, with a single 0.5 MW device deployed in summer 2018. Minesto's ambition is to install further Deep Green devices and gradually expand the site to a commercial demonstration array of up to 80 MW installed capacity (Minesto, 2019).

31. An EIA Scoping Report for an up to 80MW capacity project was submitted to NRW and the Marine Management Organisation (MMO) in February 2017 and a formal scoping opinion (SO) issued by NRW in April 2017.

32. 11.4 km north-east of the MDZ is the consented Anglesey Skerries Tidal Array project. An ES for the project was submitted in 2011 and all relevant consents were granted in February 2013. In March 2016, Atlantis Resources Corporation (who acquired the development rights for this site after acquiring Marine Current Turbines (MCT) from Siemens in April 2015) announced that the agreements for lease would be relinquished. Ownership of the site has since been returned to The Crown Estate (TETHYS, 2019).

33. There are no offshore wind farms in the immediate vicinity of the MDZ. The closest operational sites are Rhyl Flats (66 km to the north east), North Hoyle (82 km to the north east), Gwynt y Môr (67.5 km to the north east) and Burbo Bank (120 km to the north). In 2017, Ørsted completed construction on an extension to the Burbo Bank site. In 2018, The Crown Estate began work on a plan level Habitats Regulation Assessment (HRA) for offshore wind farm extensions, within which Gwynt y Môr was included.

34. The offshore wind farms in the region of MDZ, including the proposed extension to Gwynt y Môr are shown in **Figure 16-1** (**Volume II**).

35. There are no wave energy sites in the study area (Crown Estate, 2019).

16.5.1.2. Cables and Pipelines

36. There are two active telecommunication cables to the south of MDZ. The closest of these is the 'CeltixConnect' fibre optic cable stretching from Holy Island to Dublin, Ireland. It passes within approximately 200 m to the southwest of the MDZ. The cable is owned and operated by AquaComms and has been in service since 2012 (Kingfisher, 2019).

37. The second cable, the 'Emerald Bridges Fibres' fibre optic cable, is 700 m to the southwest of the MDZ and stretches from Holy Island to Clonshaugh in Ireland. The cable is owned and operated by Zayo Group and ESB Telecoms and has been in service since 2012 (Kingfisher, 2019).

38. Exiting Holyhead harbour are three out of service British Telecommunications (BT) cables, that have been out of service since 1984 (Minesto, 2016). These cables will not be impacted by activities associated with MDZ.

39. There are no active or inactive hydrocarbon pipelines in the vicinity of the MDZ (**Figure 16-1, Volume II**) (Welsh Government, 2019).

16.5.1.3. Military Activity

40. During the scoping exercise it was identified that Royal Air Force (RAF) Valley is the only Ministry of Defence (MOD) owned site on Anglesey (RHDHV, 2018). The site is located approximately 10 km to the southeast of MDZ, to the north of Rhosniegr. RAF Valley is a training base for advanced fast jets for RAF and for Royal Navy Pilots. RAF Valley was also formerly the operational base for a number of Sea King helicopters which provided a search and rescue role for the Irish Sea, Snowdonia and the wider North Wales area.

41. **Figure 16-1** (**Volume II**) shows that the MDZ is approximately 200 m to west of a Military Aerodrome Traffic Zone (MATZ) at its closest point. Due to the close proximity there may be potential for some overlap in the south east corner of the area.

42. The whole of Anglesey, the Llyn Peninsula and Snowdonia are covered by a regular military low flying area where mitigation may be necessary to resolve concerns. These concerns and any appropriate mitigation would need to be discussed through consultation with the MOD and RAF Valley (RHDHV, 2018). A further military practice and exercise area (PEXA) is located 12 km to the south of the MDZ.

43. There are no known naval exercise or live firing areas within or adjacent to the MDZ (RHDHV, 2015).

16.5.1.4. Unexploded Ordnance (UXO)

44. There are a number of areas within the Irish Sea that may present a risk of Unexploded Ordnance (UXO). The MDZ is not located within any known minefields or dumping grounds; however, there is a potential risk that munitions from minefield areas could have migrated into the MDZ over time.

45. The MDZ is located in an area with the potential for munitions to be present as a result of artillery range activities along the coast of Anglesey.

46. As a result, there may be limited potential for the presence of UXO in the MDZ from historical military practice exercises and training as well as legacy from two world wars. Whilst no UXO's were identified during the benthic survey photography, a number of anomalies were identified in the geophysical data review carried out to inform the offshore archaeology assessment (see **Chapter 13, Offshore Archaeology and Cultural Heritage**). Pre-construction studies on the potential presence of UXO would be carried out once the final positioning of arrays and wider infrastructure are known, and prior to deployment.

16.5.1.5. Oil and Gas Infrastructure

47. The offshore area around the MDZ is largely undeveloped in terms of oil and gas developments and there are currently no oil and gas installations within 60 km of the MDZ. Block 109/17 sits immediately to the north of the MDZ and was offered as part of the 30th round; however, neither this block nor any others in its vicinity were awarded to operators in the 30th Licensing Round.

48. The closest existing oil and gas infrastructure to the MDZ is the P2292 well, located 61 km away. The Conwy Oil Field (74 km north east), Douglas Oil Field (77 km north east), Hamilton Gas Field (83 km north east) and Hamilton North Gas Field within Liverpool Bay (87 km north east), are the other closest infrastructure as shown in **Figure 16-1** (**Volume II**).

16.5.1.6. Aggregate Dredging

49. There are no marine aggregate extraction activities within the immediate vicinity of the MDZ (Crown Estate, 2019). Within the wider region in the eastern Irish Sea there are currently two operational licence areas and one exploration and option area. The closest licenced aggregate extraction area is Area 457 in Liverpool Bay which is approximately 77 km north east of the MDZ.

16.5.1.7. Disposal Sites

50. The western edge of the MDZ partially overlaps the open Holyhead Deep disposal site, IS040. The disposal site is used for the disposal of dredged material, averaging approximately 85,000 tonnes of material disposed each year. The IS040 disposal site is 13 km in length and 4.4 km in width and covers an area of 57.5 km². The MDZ overlaps with approximately 0.06 km² of the disposal site.

51. The ES for the Deep Green Holyhead Deep Project (Minesto, 2016) reports that in the past, seven companies used Holyhead Deep disposal site, however since 2009 only one company has utilised it; Stena Line Ports Limited. Materials disposed of within ISO40 include both capital dredge spoil and maintenance dredge spoil. The disposal of capital dredge spoil is infrequent, but generally consist of large quantities (exceeding 100,000 tonnes in three out of five events) (Minesto, 2016). Maintenance dredge spoil is disposed of more frequently in lower quantities and has never exceeded 100,000 tonnes in a single year. Maintenance disposal spoil primarily results from maintenance dredging around Holyhead Harbour which occurs at a maximum frequency once every two years (Potter, 2014).

52. The MDZ also partially overlaps with two closed disposal sites, Holyhead South (IS041), and Holyhead East (IS042) (Welsh Government, 2019).

16.6. IMPACT ASSESSMENT

53. This assessment covers all impacts identified during scoping, and any further potential impacts that have been highlighted as the EIA has progressed. The methodology for the assessment is summarised in **Section 16.4.4** and provided in full in **Chapter 5, EIA Methodology**.

16.6.1. Overview of Potential Impacts

54. Based on the baseline information described in **Section 16.5.1**, the list below indicates the other sea users that could be impacted by the proposed Project. Cumulative and in-combination impacts are discussed in **Section 16.6.7**:

- Interaction with Military Aerodrome Traffic Zone (construction, operation and maintenance and decommissioning);
- Inadvertent interaction with UXO (construction and decommissioning); and
- Interaction with active telecommunication cables (construction, operation and maintenance and decommissioning).

55. The potential impacts due to the presence of the two closed disposal sites (with regards to disturbance of potentially contaminated sediments) has been assessed in **Chapter 8, Marine Water and Sediment Quality and Chapter 9, Benthic and Intertidal Ecology**.

56. Impacts on the following receptors were scoped out of the marine infrastructure and other sea users assessment:

- Impacts on the Deep Green Holyhead Deep project site. Despite being located only 1.2 km from the MDZ the construction, installation and operation of the MDZ will not directly impact the Deep Green Holyhead Deep project. Consideration of potential cumulative impacts are addressed in **Section 16.6.7**;
- Impacts on the Skerries Anglesey Tidal Array, due to it being located 11.4 km from the MDZ;
- Impacts on MoD Practice and Exercise Areas, due to the closest being located 12 km from the MDZ;
- Impacts on oil and gas infrastructure due to the closest being located over 74 km from the MDZ; and
- Impacts on dredging sites, due to the closes being located over 77 km from the MDZ;
- Impacts on offshore wind projects, due to the closest being located over 60 km from the MDZ.

16.6.2. Embedded Mitigation

57. The following assessment provides a summary of all impacts identified during scoping study and those which have been noted as the EIA has progressed. These impacts are not relevant to all stages of the project, and thus impacts have been assessed within the stage of the project at which they will occur (construction, operation and decommissioning). Further, these impacts are comprised of both direct and indirect impacts.

58. Menter Môn has committed to several techniques and engineering designs/modifications inherent as part of the project, during the pre-application phase, in order to avoid a number of impacts or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process (see **Chapter 4, Project Description** for further details). A range of different information sources has been considered

as part of embedding mitigation into the design of the project including engineering preference, ongoing discussions with stakeholders and regulators, commercial considerations and environmental best practice.

16.6.3. Worst Case Parameters

59. For many of the offshore EIA topics (**Chapter 9, Benthic and Intertidal Ecology**; **Chapter 11, Fish and Shellfish ecology** etc), a key consideration in terms of worst-case parameters used in the impact assessment relate to the footprint (m^2) of temporary seabed disturbance during construction works and then permanent habitat loss via project infrastructure.

60. For marine infrastructure and other users, these values are less important in the context of impact assessments, with the focus more on the scale/number/type of devices and associated infrastructure. Full details of the proposed project infrastructure are provided in **Chapter 4, Project Description** with an overview below.

61. The installation of project infrastructure, including anchor systems for Tidal Energy Converter (TEC) devices, seabed mounted devices, hubs and cables/cable protection, will all result in permanent habitat loss. Based on information provided in **Chapter 4, Project Description**, the values presented in **Table 16-7** have been calculated to define the worst-case parameters for permanent habitat loss via project infrastructure. The majority of these effects will only occur in the operational phase. Of note is the value of 7,400 m^2 related to the trench for up to nine cables at landfall, which will only be undertaken if Horizontal Directional Drilling (HDD) (which is the preferred method) is not possible/viable. Without detailed geotechnical analysis it is not currently possible to state if HDD is possible, and consequently, if trenching, and subsequent backfill of the trench(es) will be necessary. If trenching is necessary, this would represent a temporary disturbance on intertidal habitats. However, to ensure a precautionary approach is built into the assessment, it has been concluded that trenching/surface-laying of the landfall cables would lead to permanent habitat loss, thus this value is included below.

62. For the purpose of defining impact assessment parameters for the repowering phase, an assumption has been made that 50 % of the tenants will undertake repowering, i.e. for 50 % of the tenants, their infrastructure will be removed and replaced (potentially with different infrastructure by a different tenant). For the other 50 % of tenants, their infrastructure will remain over the lifetime of the project.

63. In terms of impact assessment parameters, the repowering process has, therefore, been defined as per below:

- Additional permanent habitat loss (over and above that via initial construction phase), due to placement of re-installed (repowered) foundations/TECs in different areas to where originally installed.

Table 16-7 Summary of worse-case scenario: permanent habitat loss via project infrastructure (including repowering)

Project Component	Worse Case (240 MW)	Unit	Notes
Main operational phase			
Gravity Base Structures (GBS)	74,790	m^2	Max value across entire project. Based on anchor mooring systems for floating devices. Includes hubs.
Swept Area of Catenary Cables	2,055,000	m^2	Based on: 30 devices having swept area of 9,500 m^2 (large floating devices (Orbital, Magallanes) 140 devices having swept area of 7,500 m^2 floating devices (Tocardo UFS, Aquantis) & hubs 240 devices having swept area of 3,000 m^2 small floating devices (Instream, SME PLATO)
Export Cable Footprint (cables; protection systems; rock bags)	11,745	m^2	Up to 40.5 km of export cables (with split-pipe protection/shells and rock bags)
Array Cable Footprint (cables; protection system; rock bagss)	30,040	m^2	Up to 204.5 km of array cables (with split-pipe protection/shells and rock bags)
Cable tails	120	m^2	Based on 9 x tails of 620 m length
Trench for 9 x landfall cables	7,400	m^2	740 m long trench x 10 m width in intertidal region
Footprint of Navigation Marker Buoys	540	m^2	3 m diameter square gravity anchor (9 m^2) per anchor x 60 anchors/buoys
Footprint of ADCP moorings	280	m^2	7 m^2 per ADCP mooring x 40 units
Footprint of seabed mounted environmental monitoring units	112	m^2	14 m^2 per env monitoring unit x 8 units
Footprint of mooring for floating environmental monitoring units	45	m^2	9 m^2 per mooring x 5 units
Permanent habitat loss (initial operational phase: 2,180,072 m^2 (2.18 km^2)			
Repowering Phase			
New tenant infrastructure in 50 % of berths	52,415	m^2	Total footprint of tenant infrastructure = 104,830 m^2 (GBS foundations = 74,790 m^2; array cables = 30,040 m^2): Footprint via repowering = 50 % of this value (52,415 m^2).
Permanent habitat loss (repowering of 50 % of berths): 52,415 m^2			
Permanent Habitat Loss: Total of 2,232,487 m^2 (2.23 km^2)			

64. In terms of actual device types/numbers, a maximum number of up to 620 devices could be installed at the full 240 MW capacity. These would comprise a combination of seabed mounted devices, mid-water devices and also floating (surface) devices with submerged rotors.

65. Indicative project layouts illustrating the configuration of these different device types are provided in **Chapter 4, Project Description** and demonstrate the potential for interaction between project infrastructure and other marine infrastructure and users. The worst-case layouts of tidal devices with respect to visual impact and navigation are presented in **Chapter 24, Seascape, Landscape and Visual Impact Assessment** and **Chapter 15, Shipping and Navigation** respectively.

66. The construction of offshore works (for installation of tidal devices and associated cabling and infrastructure) would be phased over a period of up to 10 years. Indicative installation periods are presented below:

- Up to 15 days per device (total = 4,306 days);
- Up to 15 days per hub (total = 1,800 days);
- Up to 1.5 days for each inter-array cable (total = 1,110 days);
- Up to 20 days for each offshore export cable (total = 180 days);
- Up to 12 days for cable protection works on each export cable (total = 108 days);
- Up to 20 days for installation of all nine (9) export cable tails (total = 20 days); and
- Up to six (6) months for HDD works at landfall.

16.6.4. Potential Impacts During Construction

16.6.4.1. Construction Impact 1: Disruption of Ongoing Ministry of Defence (MoD) Activities

67. RAF Valley is located 10 km to the south east of the MDZ, with the corresponding Military Aerodrome Traffic Zone (MATZ) located approximately 200 m from the MDZ at its closest point. As shown in **Figure 16-1** (**Volume II**), a large part of Anglesey and the surrounding offshore region is covered by an area previously identified a regularly used low flying zone.

68. Due to the MDZ being located outside of the MATZ, the magnitude of effect is assessed as Very Low, whilst due to the national importance of MOD activities the sensitivity is assessed as High. As a result, the effect is assessed as **minor.**

16.6.4.1.1. Mitigation

69. As part of the project embedded mitigation (**Chapter 4, Project Description**), ongoing engagement with the MoD RAF will be undertaken at all times during the construction phase. This will be via formal issue of Notices to Airmen (NoTAM's) prior to any major works that are judged to potentially impact aviation activities, such as those involving vessel-mounted cranes and also be ensuring that regular updates are also provided via construction phase bulletins.

16.6.4.1.2. Residual Impact

70. With successful implementation of mitigation measures, the impact will be reduced to **negligible.**

16.6.4.2. Construction Impact 2: Interaction with UXO

71. There is potential for construction activities to expose and disturb UXO. Such activities include vessel anchoring / placement of jack-up feet, ground preparation and placement of device foundation structures, electrical hubs, cables and monitoring equipment.

72. Whilst the MDZ is not located within any known minefields or disposal areas there may be potential for the presence of UXO in the MDZ from historical military practice exercises and training and as a legacy from two World Wars.

73. Without suitable mitigation being applied, due to the medium sensitivity and high magnitude of this potential effect, a **major adverse** impact could arise.

16.6.4.2.1. Mitigation

74. It will be necessary to undertake detailed risk assessment works in the development site and export cable corridor once the final positions of the infrastructure are known, in order to identify potential UXO and establish the requirements for any pre-construction survey of specific locations. Dependent on the nature of identified UXO, further investigations and/or detonations may be required, further to which a certificate would be provided to the contractor to determine that the risks associated with site investigation are reduced to As Low As Reasonably Practicable (ALARP).

75. Any proposed pre-construction marine geophysical surveys would be designed to have the potential capability to detect UXO in sufficient detail across the development site and export cable corridor. Given the moderate risk for encountering UXO in the offshore site, it is considered that the most prudent method of managing the risk to construction would be to undertake a high-resolution total field magnetometer or gradiometer survey of the specific works areas, with survey line spacing as small as 2m, and a sensor elevation not exceeding 5m (and ideally as low as 2m). Remotely operated vehicle (ROV) inspection would then be recommended to confirm whether identified targets were UXO related.

76. It may also be necessary to undertake micro-siting of infrastructure to avoid potential UXO, depending upon the results of detailed investigation.

77. In addition, it would be prudent to ensure that all construction staff have an awareness of the UXO hazard through contractors' induction processes. This will ensure that appropriate action is taken in the event that a suspect item is discovered.

78. Other risk mitigation will depend on the detail and nature of any planned works.

16.6.4.2.2. Residual Impact

79. Assuming successful implementation of the mitigation measures detailed above, any impact via interaction with UXO will be reduced to **negligible**.

16.6.4.3. Construction Impact 3: Interaction with Active Telecommunication Cables

80. The CeltixConnect cable is located approximately 200 m to the southwest of the MDZ. There is a potential impact from the deployment of anchors associated with installation barges operating near the edge of the MDZ. If anchor blocks need to be temporarily located outside the MDZ boundary then this may lead to the risk of anchor blocks being laid close to/on the CelticConnext cable, resulting in damage to this live asset.

81. Without mitigation, the magnitude of this effect is judged to be high, which when combined with the very high sensitivity of this receptor would result in a **major** impact.

16.6.4.3.1. Mitigation

82. To mitigate any risk of damage to this live cable a 500 m safety buffer will be implemented around the CeltixConnect cable during all construction works. The position of this live cable will be communicated to all installation vessels and the Project will consult with the asset owner directly.

16.6.4.3.2. Residual Impact

83. With successful implementation of appropriate mitigation measures, the significance of this impact will be reduced to **negligible.**

16.6.5. Potential Impacts During Operation

16.6.5.1. Operational Impact 1: Disruption of Ongoing Ministry of Defence (MOD) activities

84. In the operational phase there is very limited scope for impact on existing MoD/RAF activities within the MATZ. The highest structure in the MDZ will be up to eight surface-piercing electrical hubs that may be as high as 18m above LAT. A **negligible** impact is predicted.

16.6.5.1.1. Mitigation

85. As part of the project embedded mitigation (**Chapter 4, Project Description**), all project infrastructure will be communicated to the United Kingdom Hydrographic Office (UKHO) and updated on relevant Admiralty Charts.

16.6.5.1.2. Residual Impact

86. Through the above detailed mitigation measures, the potential residual impact of disruption to ongoing MoD activities is predicted as **negligible**.

16.6.5.2. Operational Impact 2: Interaction with Active Telecommunication Cables

87. The activity during this phase would be much reduced. Only maintenance and/or repowering works taking place in the development site would have any potential to impact the receptor. As a result potential impacts remain no more significant than in the main construction phase. The greatest potential sea bed scour effect in relation to interaction with active telecommunication cables will be associated with changes in the flow regimes around the foundations of devices as the flow bifurcates around the obstruction provided by each foundation. Where the sea bed

is comprised of bare bedrock or where this is covered with boulders, cobbles or gravels there is unlikely to be any change in suspended sediment concentrations. Given the nature of the sea bed morphology in the south east of the MDZ nearest the active telecommunication cables, comprising mostly of exposed bedrock, the potential for adverse effects of this nature is extremely limited.

88. A negligible magnitude of effect and low sensitivity of receptor results in a **negligible** impact**.**

16.6.5.2.1. Mitigation

89. None required.

16.6.5.2.2. Residual impact

90. A negligible impact has been predicted above and it is assessed here that no mitigation will be required and therefore the residual impact would be the same as above and is predicted to be **negligible**.

16.6.6. Potential Impacts During Decommissioning

91. At the end of the intended project lifetime of 37 years, the project will be decommissioned or re-powered. The worst-case scenario for assessment includes:

- Cables could be re-used, preserved in situ or removed. Removal is considered as the worst-case scenario for Infrastructure and Other Marine Users;
- Cable protection material will be left in situ on the sea bed, assuming that it causes no unacceptable impacts or hazards;
- Gravity base foundations (including gravity anchors) may be left in situ with piles cut to an acceptable level;
- All other components of the tidal devices (i.e. TECs, superstructure and support structure) will be removed;
- Any electrical hubs will be removed; and
- Navigation buoys and site monitoring equipment and their foundations / moorings will be removed for re-use.

92. For those activities involving the removal of assets, the types of effects would be analogous to those identified for the construction phase.

16.6.6.1. Decommissioning Impact 1: Disruption of Ongoing Ministry of Defence (MOD) Activities

93. During the decommissioning phase of The Project it is expected that impacts similar to those assessed above (**Section 16.6.4.1**) for the construction phase are predicted to arise. The magnitude of these effects may be lower due to the shorter expected timeframe of decommissioning works compared to installation.

94. As to the MDZ is located outside of the MATZ, and the Project will have been visible to the MOD throughout construction and operation, the magnitude of effect is assessed as Very Low. Due

to the national importance of MOD activities the sensitivity is assessed as High. As a result, the effect is assessed as **minor.**

16.6.6.1.1. Mitigation

95. As part of the project embedded mitigation (**Chapter 4, Project Description**), ongoing stakeholder engagement with the MOD during decommissioning, as per the construction phase.

16.6.6.1.2. Residual Impact

96. With successful implementation of mitigation measures, the impact will be reduced to **negligible.**

16.6.6.2. Decommissioning Impact 2: Interaction with UXO

97. As with construction impacts, this is dependent upon the requirement for contact with the seabed. It is expected that during normal operations any activity would be limited to the areas around installed infrastructure; these locations would be areas where there was no risk (through placement of foundations and cables in areas with no known UXO) or where UXO had been dealt with during construction, however it is noted that there is potential for movement of UXO over time due to tidal processes. Therefore, there may be potential for decommissioning activities to expose and disturb UXO, although the overall risk during decommissioning would be lower than for construction.

16.6.6.2.1. Mitigation

98. Mitigation measures will be the same as those discussed for the construction phase, within **Section 16.6.4.2.1**, with the exception of micro siting the cable. Any vessel involved with the decommissioning phase would need to be equipped to sufficiently detect UXO across the development site and export cable corridor.

16.6.6.2.2. Residual Impact

99. With the above mitigation measures adopted during the decommissioning phase it is assessed here that there would be a **negligible** residual impact from interaction with UXO on infrastructure and other marine user receptors as a result of the decommissioning phase of The Project.

16.6.6.3. Decommissioning Impact 3: Interaction with Active Telecommunication Cables

100. As with the construction impacts, the CeltixConnect and Emerald Bridge cables are located greater than 500 m from the southwest of the MDZ. There is a potential impact from the deployment of anchors associated with barges operating near the edge of the MDZ. In these areas, such anchor blocks may need to be temporarily located outside the MDZ boundary. This may lead to the risk of anchor blocks being laid close to the nearest cable (CelticConnext cable), resulting in damage to this live asset.

101. Without mitigation, the magnitude of this effect is judged to be high, which when combined with the very high sensitivity of this receptor would result in a **major** impact.

16.6.6.3.1. Mitigation

102. To mitigate any risk of damage to this live cable a 500 m safety buffer will be implemented around the CeltixConnect cable during all decommissioning works. The position of this live cable will be communicated to all installation vessels and the Project will consult with the asset owner directly.

16.6.6.3.2. Residual Impact

103. With successful implementation of appropriate mitigation measures, the significance of this impact will be reduced to **negligible.**

16.6.7. Cumulative Impacts

104. Following a review of information currently available in the public domain, it can be identified that there is a potential for cumulative or in-combination impacts with the Deep Green Holyhead Deep Phase I and subsequently Phase II tidal projects, which neighbours the MDZ to the west.

105. It is likely that the MDZ and Minesto projects will be operational simultaneously. As the Area for Lease (AfL) for both projects overlap with the current licenced area of the Holyhead Deep IS040 disposal site there may be cumulative impacts with the two projects. The EIA for the Deep Green Holyhead Deep Project Phase I (Minesto, 2016) states that disposal site ISO40 has infrequent use across the area and identifies that the disposal site boundary is likely to be re-designated, and possibly reduced in size by 50 %. Minesto (2016) suggest that if ISO40 is reduced in size the operational phases of the two projects will not affect activities at, and users of, the disposal site.

106. It is possible that during construction of these two projects, the presence of increased vessel activity in the area could result in some minor interference to vessels going to and from the disposal site, however the mitigation proposed in **Chapter 15, Shipping and Navigation** will manage vessel activity to ensure impacts are not significant.

16.6.8. Inter-Relationships

107. **Table 16-8** lists out the inter-relationships between this chapter and other chapters within the ES.

Table 16-8 Inter-Topic Relationships

Topic and description	Related Chapter	Where addressed in this Chapter	Rationale
Marine Water and Sediment Quality	Chapter 8	Section 16.6.1	Both chapters consider the potential effects of the project on the marine disposal areas.
Benthic and Intertidal Ecology	Chapter 9	Section 16.6.1 and 16.6.3	Both chapters consider the potential effects of the project on the marine disposal areas and temporary habitat loss.
Shipping and Navigation	Chapter 15	Section 16.6.7	Both chapters consider the potential cumulative effects of this project and the Minesto project on sea users.

108. Alongside the other users considered for the purposes of this chapter a number of other users have been considered separately, which are reported on in **Chapter 14, Commercial Fisheries, Chapter 15, Shipping and Navigation, Chapter 23, Traffic and Transport** and **Chapter 25, Socio-economics, Tourism and Recreation.**

16.6.9. Interactions

109. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The worst case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity the areas of interaction between impacts are presented in **Table 16-9**, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 16-9 Potential Interaction Between Impacts

Potential interaction between impacts			
Construction/ Decommissioning	Impact 1: Disruption of ongoing MOD activities	Impact 2: Interaction with UXO	Impact 3: Interaction with active telecom. cables
Impact 1: Disruption of ongoing MOD activities	-	Yes	No
Impact 2: Interaction with UXO	Yes	-	No
Impact 3: Interaction with active telecom. cables	No	No	-
Operation	Impact 1: Disruption of ongoing MOD activities	Impact 2: Interaction with UXO	Impact 3: Interaction with active telecom. cables
Impact 1: Disruption of ongoing MOD activities	-	Yes	No
Impact 2: Interaction with UXO	Yes	-	No
Impact 3: Interaction with active telecom. cables	No	No	-

16.7. SUMMARY

110. Whilst the MDZ is in close proximity to the CeltixConnect active telecommunications cable, modelling (as discussed and presented in **Chapter 7, Metocean Conditions and Coastal Processes**), demonstrates that only very minor changes are expected, even under the worst-case scenarios, to scour and sediment plumes in the vicinity of the active telecommunications cable. However, to prevent any potential for interaction with the cables a proposed 500 m safety buffer will be implemented.

111. Given the location of the MDZ, there is potential to expose and disturb UXO. Mitigation will be put in place to reduce the risk from UXO encountered.

112. To date there has been no consultation response from the MOD and therefore it has not been possible to assign a significance to potential impacts upon ongoing military activities. However, the assessment highlights that due to the MDZ being located outside of the MATZ any potential for impact during all phases of the MDZ project are likely to negligible.

113. The assessment is summarised in **Table 16-10**.

Table 16-10 Summary of Potential Impacts Identified

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Additional Mitigation Measures	Residual Impact
Construction Phase						
Impact 1: Disruption of ongoing MOD activities	MOD	High	Very Low	Minor	On-going stakeholder engagement. Plotting MDZ on Admiralty charts.	Negligible
Impact 2: Interaction with UXO	Sea Users (crew / vessels), environmental receptors	N/A	N/A	Potential to disturb and expose UXO	Risk assessment and potential survey required to identify location of potential UXO. If UXO present, infrastructure could be micro-sited or UXO cleared. Contractors to be made aware of potential risks.	Minor
Impact 3: Interaction with active telecommunication cables	CeltixConnect Subsea cable	High	Very low	Minor	Implementation of 500 m safety buffer around active subsea cable. The position of this live cable will be communicated to all installation vessels and the Project will consult with the asset owner directly.	Negligible
Operational Phase (including repowering)						
Impact 1: Disruption of on-going Ministry of Defence (MOD) activities	MOD	High	Very Low	Minor	Ongoing stakeholder engagement.	Negligible
Impact 2: Interaction with active telecommunication cables	CeltixConnect Subsea cable	High	Very low	Minor	None required.	Negligible
Decommissioning Phase						
Impact 1: Disruption of on-going Ministry of Defence (MOD) activities	MOD	High	Very Low	Minor	Ongoing stakeholder engagement.	Negligible

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Additional Mitigation Measures	Residual Impact
Impact 2: Interaction with UXO	Sea Users (crew / vessels), environmental receptors	N/A	N/A	Potential to disturb and expose UXO	As per construction	Minor
Impact 3: Interaction with active telecommunication cables	CeltixConnect Subsea cable	High	Very low	Minor	Implementation of 500 m safety buffer around active subsea cable. The position of this live cable will be communicated to all decommissioning vessels and the Project will consult with the asset owner directly.	Negligible

16.8. REFERENCES

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