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Morlais Project
Environmental Statement

Chapter 8: Marine Water and Sediment Quality

Volume III

Applicant: Menter Môn Morlais Limited
Document Reference: PB5034-ES-008
Chapter 8: Marine Water and Sediment Quality
Author: Marine Space

MarineSpace
Making Sense of the Marine Environment ™

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Morlais Project
Environmental Statement

Appendix 8.1: Water Framework Directive Compliance Assessment

Volume III

Applicant: Menter Môn Morlais Limited

Document Reference: PB5034-ES-0081

Appendix 8.1: WFD Compliance Assessment

Author: Marine Space & Royal HaskoningDHV

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GLOSSARY OF ABBREVIATIONS

A/HMWB	Artificial or Heavily Modified Water Body
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
DCO	Development Consent Order
DfT	Department for Transport
DECC	Department of Energy and Climate Change
DO	Dissolved Oxygen
EA	Environment Agency
EC	European Commission
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EQS	Environmental Quality Standards
EQSD	Environmental Quality Standards Directive
ES	Environmental Statement
FCA	Flood Consequence Assessment
GBS	Gravity Base Structures
GEP	Good Ecological Potential
GES	Good Ecological Status
GPP	Guidance for Pollution Prevention
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HDD	Horizontal Directional Drilling
HRA	Habitat Regulations Assessment
INNS	Invasive Non-Native Species
IPPC	Integrated Pollution and Prevention Control
JLDP	Joint Local Development Plan
MDZ	Morlais Demonstration Zone
MLWS	Mean Low Water Springs
MPCP	Marine Pollution Contingency Plan
MSFD	Marine Strategy Framework Directive
NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
PEL	Probable Effect Level
RBD	River Basin District
RBMP	River Basin Management Plan
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFW	Shellfish Water

SPA	Special Protected Area
TEC	Tidal Energy Converters
TEL	Threshold Effect Level
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TWAO	Transport and Works Act Order
UK	United Kingdom
VER	Valued Ecological Receptor
WFD	Water Framework Directive

1. WATER FRAMEWORK COMPLIANCE ASSESSMENT

1.1. INTRODUCTION

1. This report aims to determine whether the onshore and offshore activities associated with the proposed Morlais Project (the Project) are compliant with the Directive of the European Parliament and of the Council 2000/60/EC establishing a framework for community action in the field of water policy (known as the Water Framework Directive (WFD)).

2. A brief description of the Project is provided in this report. A more detailed description is provided in **Chapter 4, Project Description** of the Environmental Statement (ES).

3. The objectives of this compliance assessment are to:

    - Identify water bodies that could potentially be affected by the Project;
    - Identify activities that could affect these WFD water bodies;
    - Assess the potential for the proposed project activities to result in a deterioration in the status of WFD water bodies, or prevent status objectives being achieved in the future; and
    - Determine the compliance of the Project with the requirements of the WFD.

4. This report sits as an appendix to **Chapter 8, Marine Water Quality and Sediment Quality** and has been prepared as part of the ES of the Project to be submitted alongside a Transport and Works Act Order (TWAO) application, and a Marine Licence application.

5. It should be read in conjunction with the relevant chapters of the ES and has drawn upon information and assessments provided in:

    - **Chapter 4, Project Description**;
    - **Chapter 7, Metocean Conditions and Coastal Processes**;
    - **Chapter 8, Marine Water and Sediment Quality**;
    - **Chapter 9, Benthic and Intertidal Ecology**;
    - **Chapter 10, Fish and Shellfish Ecology**; and
    - **Chapter 17, Water Resources and Flood Risk**, with associated Flood Consequence Assessment (FCA) Appendix (**Appendix 17.1, Volume III**).

1.1.1. The Water Framework Directive

1.1.1.1. Overview

6. The WFD is transposed into national law by means of the Water Environment (WFD) (England and Wales) Regulations 2017. The WFD Regulations provide for the implementation of the WFD, from designation of all surface waters (rivers, lakes, transitional (estuarine) waters, coastal waters and ground waters) as water bodies, to the requirement to achieve Good Ecological Status (GES) or Good Ecological Potential (GEP).

7. Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), respectively), which apply only to designated sites, the WFD applies to all bodies of water, including those that are man-made. The consideration of the proposals under the WFD will, therefore, apply to all water bodies that have the potential to be impacted by the Project.

1.1.1.2. Surface Waters

8. There are two separate classifications for surface water bodies (including rivers, lakes, transitional and coastal waters); ecological and chemical. For a water body to be in overall 'good' status, both ecological and chemical status must be at least 'good'. The ecological status of surface waters is classified using information on the biological, physico-chemical and hydromorphological quality of the body of water.

9. The ecological status of a surface water body is assessed according to:

- The condition of biological elements, for example fish, benthic invertebrates and other aquatic flora;
- The condition of supporting physico-chemical elements, for example thermal conditions, salinity, and concentrations of oxygen, ammonia and nutrients;
- Concentrations of specific pollutants, for example copper and other priority substances; and
- The condition of the hydromorphological quality elements, including morphological condition, hydrological regime and (for coastal waters only) tidal regime.

10. Ecological status is recorded on the scale of high, good, moderate, poor or bad. 'High' denotes largely undisturbed conditions and the other classes represent increasing deviation from this natural condition, otherwise described as a 'reference condition'. The ecological status classification for the water body, and the confidence in this, is determined from the worst scoring quality element. This means that the condition of a single quality element can cause a water body to fail to reach its WFD classification objectives.

11. Chemical status is assessed by compliance with environmental standards for chemicals that are listed in the EC Environmental Quality Standards Directive (2008/105/EC). These chemicals include priority substances, priority hazardous substances, and eight other pollutants carried over from the Dangerous Substance Daughter Directives. Chemical status is recorded as 'good' or 'fail'. The chemical status classification for the water body is determined by the worst scoring chemical. The WFD seeks to reduce Priority Substances (20 are Priority Substances and 13 are Priority Hazardous Substances = 33 in total) in the marine environment through the use of the Environmental Quality Standards Directive (EQSD) for discharges and outfalls. Priority substances include benzene, nickel and lead.

12. Where the hydromorphology of a surface water body has been significantly altered for anthropogenic purposes, it can be designated as an Artificial or Heavily Modified Water Body (A/HMWB). An alternative environmental objective, GEP applies in these cases.

13. HMWBs are classified according to the 'mitigation measures approach' (UKTAG, 2013). This approach first assesses whether actions to mitigate the impact of physical modification are in place to the extent that could reasonably be expected. If this mitigation is in place, then the water body may be classified as achieving 'good' or better ecological potential. If this level of mitigation is not in place, then the water body will be classed as 'moderate' or worse ecological potential. Before an overall ecological potential classification is applied, the second step is for the results of the mitigation measures assessment to be cross-checked with data from biological and physico-chemical assessments. This approach is known as the “Alternative Approach” and is defined in more detail in the WFD Common Implementation Strategy (EC, 2004). Checklists of mitigation measures have been developed based on the steps identified in the Alternative Approach to enable large numbers of heavily modified and artificial water bodies to be assessed consistently and across sectors (UKTAG, 2008).

14. The process of classifying ecological potential is based on an assessment of:

- Whether all appropriate measures have been taken to mitigate the modified or artificial hydromorphological characteristics of the water body;
- Whether these measures are functioning; and
- Whether all non-sensitive quality elements are at good status or better.

15. Where Natural Resources Wales (NRW) has data for biological quality elements that show signs of damage from pressures other than hydromorphological alterations (for example, if the benthic invertebrate status is poor because of nutrient pressures) the ecological potential will be changed. To reflect this other pressure the water body will be labelled as having 'Poor Ecological Potential'. This is also true where data are available for physico-chemical quality elements.

16. In addition, some surface waters require special protection under other European legislation. The WFD therefore brings together the planning processes of a range of other European Directives, such as the revised Bathing Waters Directive (2006/44/EC) and the Habitats Directive. These Directives establish protected areas to manage water, nutrients, chemicals, economically significant species and wildlife, and have been brought in line with the planning timescales of the WFD.

1.1.1.3. Coastal Water Bodies

17. Coastal water bodies are assessed following the Environment Agency’s ‘Clearing the Water for All’ Guidance (2016), in the absence of any guidance specific to Wales, as it provides a thorough assessment. Water bodies are assessed in terms of the potential for deterioration to their chemical and ecological status based on the risk of impacts to certain receptors including:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality; and
- Protected areas.

18. This assessment is reliant on identifying those effects that are non-temporary. For the purposes of this assessment, non-temporary is defined as:

"*Non-temporary: A period of time that is greater than the recommended monitoring period interval as stated by the WFD (2000/60/EC).*"

1.1.1.4. Groundwaters

19. Groundwaters are assessed in a different way to surface waters. Instead of GES and GEP, groundwaters are classified as either Poor or Good in terms of quantity (groundwater levels, flow directions) and quality (pollutant concentrations and conductivity). Again, UKTAG have provided guidance on how groundwater quantity and quality is assessed (UKTAG, 2012a; UKTAG, 2012b).

1.1.1.5. Shellfish Waters

20. The WFD incorporates the 'Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the Quality Required of Shellfish Waters', also known as the Shellfish Waters Directive, which aims to protect and improve water quality and support the growth of healthy shellfish (bivalve and gastropod molluscs) and contribute to good quality edible shellfish.

21. The Shellfish Waters Directive establishes parameters applicable to designated Shellfish Waters (SFWs), as well as indicative values, mandatory values, reference methods of analysis and the minimum frequency for taking samples and measurements. These parameters are set for pH, temperature, salinity and the presence or concentration of certain substances (dissolved oxygen, hydrocarbons, metals, organohalogenated substances etc.).

22. The competent authorities for each Member State must take samples from the waters to verify their conformity with the criteria set by the Directive. The following proportions of samples must conform to the established values:

- 100 % of the samples for the parameters 'organohalogenated substances' and 'metals';
- 95 % of the samples for the parameters 'salinity' and 'dissolved oxygen';
- 75 % of the samples for the other parameters; and
- No evidence of harm to the shellfish from organohalogenated compounds.

23. Additionally, the Directive stipulates that a discharge should not cause increase of suspended solids to exceed 30 % above background levels, as shellfish can be adversely affected by the smothering effects of sediment settling.

1.1.1.6. Bathing Waters

24. The EC's Bathing Water Directive 2006/7/EC applies to surface waters that can be used for bathing and is integrated into the WFD through the management of water quality management. Two main parameters are defined for analysis including intestinal enterococci and *Escherichia coli* and bathing waters must be monitored each year.

25. Bathing waters are then classified according to their level of quality: poor, sufficient, good or excellent based on quality standards for bacteriological quality.

1.2. CONSULTATION

Consultation with statutory bodies and key stakeholders was undertaken through a formal EIA scoping process for the Project. The key items of consultation relevant to the WFD assessment have been summarised in **Table 1-1** below.

Table 1-1 Summary of Relevant Consultation Responses

Parameter	Comment	Response
Water Resources and Flood Risk	"Water Framework Directive: ▪ The consideration of potential impacts to Water Framework Directive waterbodies is welcomed, although the Scoping Report has not identified the existing water body status for the Caernarfon Bay North coastal water body within which the application site is located. The catchment summary for this water body confirms that it has an overall 'Good' status. The Applicant should demonstrate that the Proposed Works would not affect waterbody status and is advised to follow the WFD assessment framework set out in NRW's response (see Appendix 1 of this Scoping Opinion)."	**Section 1.7** Stage 3: Detailed Compliance Assessment demonstrates that the Proposed works will not affect waterbody status.
Policy and Legislation	▪ "The applicant will need to consider the implication of the proposals on European Directives in the ES, including; ▪ EC Habitats Directive (protected sites and protected species) ▪ Marine Strategy Framework Directive ▪ Water Framework Directive ▪ The requirements of national legislation will also need to be considered, including; ▪ The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000 ▪ The Conservation of Habitats and Species Regulations 2017 (as amended) ▪ The Environment (Wales) Act 2016"	This report represents the WFD compliance assessment for the Project and considers the implications of the proposals on the Water Framework Directive.
Metocean Conditions and Coastal Processes	▪ Further information is required regarding how the potential impacts to the physical processes caused by the deployment of multiple tidal energy devices will be qualitatively and quantitatively assessed using a non-numerical approach i.e.	See **Chapter 7, Metocean Conditions and Coastal Processes**

Parameter	Comment	Response
	development of a conceptual model. The physical processes impact assessment is an important assessment as any alteration to the flow conditions, waves regime and sediment transport pathways caused by the presence of the tidal devices and the associated infrastructure will potentially impact on the intertidal and subtidal benthic ecology, water quality and coastal morphodynamics. This in turn could then affect the integrity of the protected sites designated under the Habitats directive and affect the ecological status defined under the Water Framework Directive.	
Marine Water and Sediment Quality	▪ In section 7.2.1.1 there is reference to the bathing water quality for eight beaches in the MDZ coastal area and reference to one designated European Shellfish Water. There is, however, no inclusion of the Water Framework Directive (WFD) existing water body status for the coastal water bodies within the demonstration zone. This is an important omission from the water quality section.	**Section 1.5.2** identifies the water bodies for consideration within the compliance assessment and includes their existing water body status.
Water Resources and Flood Risk	▪ The demonstration zone is located at its nearest point, 0.5 km (0.27 nautical miles) from the west coast of Holy Island Anglesey and falls within the Caernarfon Bay North WFD coastal water body which currently has an overall Good status, with a Good chemical status and a good ecological status. We advise that a Preliminary WFD Assessment report is prepared by the applicant in support of the application and, where required, a detailed WFD Compliance Assessment Report be undertaken.	This report represents the WFD compliance assessment for the Project
Water Resources and Flood Risk	▪ We welcome further discussion relating to WFD compliance assessment. We advise that WFD should be considered at an early stage in project planning and included in preapplication discussions to ensure avoidance, mitigation and/or improvement measures are built in to the project where appropriate to minimise costs for the applicant and to provide the best environmental outcome.	This report represents the WFD compliance assessment for the Project

Parameter	Comment	Response
Water Resources and Flood Risk	▪ "The Directive does not specify the format or process to follow for WFD assessments. This allows a flexible and proportionate approach to be undertaken. To aid in the decision-making process, it is recommended that the appraisal of an activity or project is conducted in 3 stages: ▪ Screening: exclude any activities that do not need to go through the scoping or detailed assessment stages ▪ Scoping – identify the quality elements that are potentially at risk from the proposed activity and need further detailed assessment ▪ Detailed assessment – consider the potential impacts of an activity on bodies of surface and ground water, identify ways to avoid or minimise impacts, and identify if an activity may prevent the water body achieving good status or cause deterioration."	The three stages are covered in the following sections: **Section 1.5** covers Stage 1: Screening, **Section 1.6** covers Stage 2: Scoping, and **Section 1.7** covers Stage 3: Detailed Compliance Assessment
Water Resources and Flood Risk	"The WFD assessment must consider: ▪ all activities carried out; and, ▪ each stage of the activity, for example construction, operation, maintenance and decommissioning ▪ The WFD compliance assessment process needs to also consider the zone of influence of the project in its entirety and any WFD waterbodies that fall within it, not just where there are direct impacts. ▪ Consideration should be given to whether the potential impacts are short term effects (< 6 years) or will cause a non temporary/permanent change (e.g. direct habitat loss alteration to sediment transport pathways, interference with migratory fish pathways etc). If the impacts are considered a non temporary/permanent effect on the biological, chemical or hydro morphological elements of the WFD water body in question then the impact must be carried forward for consideration in the WFD compliance assessment process."	This report represents the WFD compliance assessment for the Project. **Sections 1.6** and **1.7** consider impacts to each receptor.
Water Resources and Flood Risk	▪ Please see attached OGN 72 for further consideration. This is NRW's internal guidance document on assessing activities and projects for compliance with the Water	This document has been written in view of EA's Clearing the Water for All guidance, for the purposes of this assessment, the

Parameter	Comment	Response
	Framework Directive. It is worth highlighting that these documents are intended for internal NRW use and therefore some of the links may not work and some content may not be relevant externally.	assessment technique remains the same as the OGN 72.
Policy and Legislation	"As set out in the scoping report, the Environmental Statement will need to consider the implication of the proposals on European Directives, including; ▪ EC Habitats Directive (protected sites and protected species) ▪ Marine Strategy Framework Directive ▪ **Water Framework Directive"**	This report represents the WFD compliance assessment for the Project
Metocean Conditions and Coastal Processes	▪ The ES must appropriately assess the potential impacts to physical processes caused by the deployment of multiple tidal energy devices. The physical processes impact assessment is an important assessment as any alteration to the flow conditions, waves regime and sediment transport pathways caused by the presence of the tidal devices and the associated infrastructure will potentially impact on the intertidal and subtidal benthic ecology, water quality and coastal morphodynamics. This in turn could then affect the integrity of the protected sites designated under the Habitats Directive and affect the ecological status defined under the Water Framework Directive. It is currently unclear how this will be qualitatively and quantitatively assessed using a non-numerical approach i.e. development of a conceptual model.	See **Chapter 7, Metocean Conditions and Coastal Processes**

1.3. PROJECT DESCRIPTION

26. This WFD assessment focuses on both those elements of the Project relevant to the offshore/coastal areas designated for WFD consideration and those onshore elements relevant surface and groundwater bodies. A summary of the project description is provided here, to provide an overview of the Project (drawing on the information in **Chapter 4, Project Description**).

27. The Project will comprise an offshore development area including the Morlais Demonstration Zone (MDZ) covering an area of 35 km², combined with an export cable corridor with an area of 4.75 km², plus associated onshore infrastructure contained within an onshore development area of 1 km². The total installed capacity of the Project will be up to 240 MW.

1.3.1. Offshore

28. The MDZ is in the eastern Irish Sea, encompassing a sea bed area of approximately 35 km^2. Its nearest point is located approximately 0.5 km from the west coast of Anglesey. Marine subsea cables would connect tidal devices within the main site to the mainland via an export cable corridor, with landfall for up to nine of these cables near Penrhos Feilw, within an embayment known as 'Abraham's Bosom'.

29. The key elements of the Project are presented below:

- The area of the main MDZ array: 35 km^2;
- The area of the export cable corridor is 4.75 km^2;
- Up to a maximum of 620 Tidal Devices within the MDZ;
- Up to a maximum of 1,648 Tidal Energy Converters (TEC's);
- Up to 740 inter-array cables within the MDZ;
- Up to nine export cables;
- Up to nine export cable tails (shared with onshore components);
- Navigation and environmental monitoring equipment;
- Mooring and foundation structures; and
- Offshore electrical infrastructure, including submerged, floating or surface emergent hubs.

30. The tidal devices installed by the Project will have the following key elements:

- A foundation or anchor on or within the seabed;
- A supporting substructure or mooring;
- TEC; and
- Cable connections.

31. Of specific relevance to the WFD assessment are those components with the potential to create an effect-receptor pathway between the Project and WFD waterbodies. As part of the MDZ array site and all of the export cable corridor lie within the Caernarfon Bay North (GB621010380000) Coastal Water Body, all marine components of the Project (see above) have been considered in this assessment.

1.3.2. Onshore

32. The key components of the onshore works associated with the Project include:

- Landfall works located within the bay on the western coast of the Holy Island known as 'Abraham's Bosom', including:
  - Up to nine Horizontal Direction Drilling (HDD) ducts or trenched equivalents;
  - Up to nine transition pits or bays;
  - Up to nine export cable tails (shared with offshore components);

- Landfall Substation;
- Switchgear Building;
- Onshore cable route (between Landfall Substation and Grid Connection Substation; and
- Grid Connection Substation.

1.4. ASSESSMENT METHODOLOGY

33. This section sets out the approach for each of the key stages in the WFD compliance assessment process for the WFD compliance assessment. For each stage, a description of the procedure is provided, together with initial, relevant information that may facilitate decision-making at this early stage of the process.

1.4.1. The Approach to Assessing WFD Compliance

34. NRW is currently aiming to achieve "Good status" in at least 60 % of waters by 2021 and in as many waters as possible by 2027. "Good status" comprises two parts. The first is "Good ecological status" (or "Good ecological potential", for waterbodies classed as heavily modified or artificial). The second is "Good chemical status". "Good ecological status/ potential" includes biological, hydromorphological and physicochemical quality elements and specific pollutants. "Good chemical status" concerns a series of Priority Substances, including priority hazardous substances. The WFD also requires that relevant protected area objectives are achieved (EA, 2015).

35. There is no detailed published methodology for the assessment of plans or projects in relation to undertaking WFD compliance assessments across all types of water bodies. There are, however, several sets of guidance that have been developed in relation to undertaking such assessments in different water body types. Some are produced by the Environment Agency (EA) and are included here in the absence of any equivalent guidance produced by NRW. Those considered most relevant to the Project are:

- EA (2016) Clearing the Waters for all guidance for assessing impacts in estuarine (transitional) and coastal waters for the WFD;
- The WFD (Standards and Classification) Directions (England and Wales (2017). This document provides the most up to date standards used to determine the ecological and chemical status of surface water bodies and quantitative and chemical status of groundwater;
- Advice Note 18: The WFD (Planning Inspectorate, 2017), which provides an overview of the WFD and provides an outline methodology for considering WFD as part of the DCO process; and
- WFD risk assessment: How to assess the risk of your activity (Environment Agency, 2016a), which provides guidance for bodies planning to undertake activities that would require a flood risk activity permit.

36. In order to undertake this WFD compliance assessment which takes into account surface, coastal and groundwater bodies; the broad methodologies outlined in the guidance documents

above have been combined to produce an assessment process following the four stages listed below:

- Stage 1: Screening;
- Stage 2: Scoping;
- Stage 3: Detailed compliance assessment; and
- Stage 4: Summary of mitigation, improvements and monitoring.

37. These stages are described in more detail in the sections below.

1.4.1.1. Screening

38. This stage collates all available baseline information and data necessary to complete the WFD compliance assessment including the baseline environment, the water bodies that could be impacted and details of other activities outside the Project which could also impact on the water bodies.

39. Water bodies will be selected for inclusion in the early stages of the compliance assessment using the following criteria:

- All surface water bodies that could potentially be directly impacted by the Project;
- Any surface water bodies that have direct connectivity (e.g. upstream and downstream) that could potentially be affected by the Project; and
- Any groundwater bodies that underlie the Project.

40. With regard to coastal waterbodies; according to the EA Clearing the Waters for All guidance (EA, 2016), MDZ is categorised as a new Project (i.e. one which has started after 1st January 2009). As a result, the Project assessment is not required to include the screening stage and therefore is required to commence at the scoping stage. However, initial screening information is necessary as part of the scoping stage and, therefore, this stage is still often completed in practice in order to inform the WFD scoping. Additionally, screening the construction and operation and maintenance (O&M) activities of projects enables a high-level initial assessment of those activities that could impact on compliance parameters within WFD waterbodies. Screening has been undertaken in this assessment to inform the scoping phase.

1.4.1.2. Scoping

41. This stage identifies whether there is potential for deterioration in water body status or failure to comply with WFD objectives for any of the water bodies identified in Stage 1 (**Section 1.4.1.1**). This stage considers potential non-temporary impacts and impacts on critical or sensitive habitats. This scoping assessment is undertaken separately for each water body and each activity.

42. Water bodies and activities can be scoped out of further assessment if it can be satisfactorily demonstrated that there will be no impacts. If impacts are predicted, it will be necessary to undertake a detailed compliance assessment.

43. The potential for deterioration in protected areas such as Bathing Waters and Shellfish Waters located within the water bodies are also considered within the WFD compliance assessment where relevant.

44. The coastal water bodies are assessed, under the Clearing the Waters for All guidance, we regard to the following six receptors:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality;
- Protected areas; and
- Invasive Non-Native Species (INNS).

45. Groundwater bodies are assessed according to their quantity and their quality, and any deterioration to either of these has been assessed **in Section 1.6.1**.

46. The end result of Stage 2 is a list of water bodies, project activities and quality elements to be carried forward for further consideration in the detailed assessment stage (Stage 3).

1.4.1.3. Detailed Compliance Assessment

47. The Stage 3 assessment determines whether the activities and/or project components that have been put forward from the Stage 2 (**Section 1.4.1.2**) scoping assessment will cause deterioration and whether this deterioration will have a significant non-temporary effect on the status of one or more WFD quality elements at water body level. For priority substances, the process requires the assessment to consider whether the activity is likely to cause the quality element to achieve good chemical status.

48. Deterioration is defined as when the status of a quality element reduces by one class. For example, biological quality elements move from “Good” to “Moderate” status. If a quality element is already at the lowest status, then any reduction in its condition counts as deterioration. According to the EA (2016) guidelines, temporary effects due to short-duration activities like construction or maintenance are not considered to cause deterioration if the waterbody would recover in a short time without any restoration measures. Where relevant, mitigation measures should be included to avoid or minimise risks of deterioration.

49. If it is established that an activity and/or project component is likely to affect status at water body level (that is, by causing deterioration in status or by preventing achievement of WFD objectives and the implementation of mitigation measures for HMWBs), or that an opportunity may exist to contribute to improving status at a water body level, potential measures to avoid the effect or achieve improvement must be investigated. This stage considers such measures and, where necessary, evaluates them in terms of cost and proportionality.

50. Note that this stage is referred to as a WFD Impact Assessment in the Planning Inspectorate (2017) guidance.

1.4.1.3.1. Determination of Deterioration

51. Any deterioration identified must be considered within the context of the water body, in terms of the scale and magnitude of the impact as well as the timescales over which the impact would occur. This assessment will therefore differ depending on the nature of the water body (i.e. marine, freshwater or groundwater).

52. It is important to consider all levels of deterioration from short term impacts to potentially long-term changes to water body status classifications. The assessment will therefore consider the potential for between class, within class and temporary deterioration in water body status. Where deterioration is not predicted, the activity will also be considered against the water body objectives to ensure status objectives (i.e. GES or GEP) will not be prevented.

1.4.1.4. Assessment Criteria

53. This assessment has considered each stage of activity (construction, O&M and decommissioning) of the Project.

54. Hydromorphology in this assessment is defined as the physical characteristics of the waterbody, including the size, shape, structure; and for marine bodies the flow and quantity of water and sediment.

55. Biological habitats (both those designated as higher and lower sensitivity habitats) will be considered if the footprint of activities is any of following:

- 0.5 km² or larger;
- 1 % or more of the waterbody's area;
- Within 500 m of any higher sensitivity habitat; or
- 1 % or more of any lower sensitivity habitat.

56. The impacts resulting from the proposed activities on water quality will be assessed for:

- Whether it could affect water clarity, temperature, salinity, oxygen levels, nutrients microbial patterns continuously for longer than a spring neap tidal cycle (approximately 14 days;
- Whether it is in waterbody/ waterbodies with a phytoplankton status of moderate, poor or bad; or
- Whether the waterbody/ bodies have a history of harmful algae.

57. Impacts will also be considered on WFD protected identified Bathing Waters, Shellfish Waters and nutrient sensitive areas. A Habitat Regulations Assessment (HRA) Report to Inform Appropriate Assessment (RIAA) has been undertaken to assess the potential impacts on Special Areas of Conservation (SAC), Special Areas of Protection (SPA) and Ramsar sites, and their associated features. This document has been referred to where the WFD assessment requires consideration of designated sites.

1.4.2. Data Sources

58. The following data sources have been collated and used to inform the assessment:

- NRW's Water Watch Wales web-page;
- Relevant chapters from the Morlais ES;
- NRW bathing water classifications; and
- Lle Welsh marine planning portal.

1.5. STAGE 1: SCREENING

1.5.1. Purpose of this Section

59. This section describes the baseline characteristics of the WFD receptors that are hydraulically connected to both the onshore and offshore project area, against which potential impacts on WFD compliance will be assessed. As required under the EA (2016) guidance waterbodies were identified based on the following criteria:

- Any offshore designated site, of relevance to the WFD, within 2 km of the Project boundary;
- Any WFD waterbody within 2 km of the Project boundary; and
- Any priority habitat within 500 m of the Project boundary.

60. The section includes a description of the Project and provides a summary of the main characteristics of the water bodies that could be impacted by the Project.

1.5.2. Identification of Water Bodies

61. **Figure 8-1** (**Volume II**) shows the WFD water bodies screened into the WFD Compliance Assessment. These water bodies are described below in **Table 1-2**.

62. There are no WFD river or transitional water bodies within the vicinity of the Project. Therefore, only groundwater and coastal water bodies are considered in the WFD Compliance Assessment. It is important to note that, because the freshwater catchments in the study area are too small to have been defined as river water bodies in their own right (i.e. they are <5 km^2), they have been considered to form part of the coastal water bodies into which they drain for the purposes of this assessment.

Table 1-2 WFD Water Bodies Screened into the WFD Compliance Assessment

Water body name and WFD reference	Water body type	Status and comments
Ynys Mon Groundwater body GB41002G204400	Groundwater	A proportion of this water body underlies the entire project area. It is currently at good quantitative status, but at poor chemical status in 2015. However, no known technical solution to this is known. It covers an area of 623.22 km^2 in total.
Caernarfon Bay North GB621010380000	Coastal water body	Many of the surface water features identified as interacting with this project drain into this coastal water body. It is currently at good status and covers an area of 135.19 km^2.

63. Data for the assessment for each water body was obtained from the second River Basin Management Plan status objectives published by NRW in 2017. Data relating to groundwater is not updated as frequently and therefore was last assessed in 2015. This data is presented on the Water Watch Wales Cycle 2 Rivers and Waterbodies online viewer.

1.5.3. Identification of WFD Protected Areas

64. All screened-in WFD protected areas are presented in **Figure 8-1** (**Volume II**). Further information about the reasons and features of the designated sites can be found in **Chapter 9, Benthic and Intertidal Ecology**.

65. As required under the EA (2016) guidance the following designations have been considered in this WFD assessment:

- SAC;
- SPA;
- Bathing Waters;
- Shellfish Waters; and
- Nutrient Sensitive Waters.

66. The following sites described below are within 2 km of the Project boundary;

- North Anglesey Marine SAC;
- Anglesey Terns SPA; and
- Porth Dafarch Bathing Water.

67. No shellfish waters or nutrient sensitive waters were screened into this assessment due to none being located within 2 km of the MDZ site and cable corridor.

Table 1-3 Project Activity and Potential Impact Mechanism during Construction

Protected Area	Location	Reason for Designation
North Anglesey Marine SAC	Overlaps with the MDZ	The SAC runs from the northern coast of the Isle of Anglesey into the Irish Sea and has been identified as an area of importance for harbour porpoise. Covering an area of 3,249 km^2, this site spans water depths which range from the Mean Low Water Springs (MLWS) level down to 100 m along the western boundary, though much of the site is 50 m or shallower. The North Anglesey Marine SAC overlaps a range of other habitats including coarse and sandy sediments, rock, and mud.
Anglesey Terns SPA	Overlaps with the MDZ	A site comprised of a series of islands which extends around most of the east, north and west coasts of Anglesey, from the mean high water mark out to between 10 km and 20 km from shore. This site is primarily designated to protect the classified population of foraging terns during the breeding season. This site supports the largest tern colony in Wales (500-900 breeding pairs) of roseate, sandwich, common and arctic.
Porth Dafarch Bathing Water	1.39 km from the MDZ	Porth Dafarch is the only designated bathing water within 2 km of the site.

1.5.4. Potential Impacts of the Project

68. Detailed information on the scale and nature of project-related effects is available in **Chapter 4, Project Description** of the ES. However, on the basis of the range of activities associated with the Project, **Table 1-4** and **Table 1-5** set out examples of the types of effects potentially relevant to the WFD compliance assessment that could be expected within the construction and operation phases. It should be noted that these impact mechanisms are theoretical and do not necessarily indicate that an effect will occur, nor is the list exhaustive.

69. It may be possible for relatively straightforward reasons (e.g. no identifiable impact pathway) to scope out some project activities during Stage 2. However, to do so will require sufficient project information to be available that allows reasoned and clear conclusions to be reached. Where there is uncertainty over the potential for an activity to have an effect then a precautionary view will be taken, and the activity will be screened in for further assessment.

Table 1-4 Project Activity and Potential Impact Mechanism During Construction

Activity	Potential mechanisms for impact on WFD quality elements
Initial site preparation, earthworks and works associated with all onshore infrastructure (i.e. Landfall Substation, Switchgear Building and Grid Connection Substation, landfall and cable installation), including the stockpiling of materials and cable installation works	Changes in infiltration to the groundwater body and potential for ingress of spilled contaminants both of which could impact on groundwater quality.
The proposed offshore works, in particular deployment of Tidal Energy Converters (TEC's), foundations and cables/cable protection (rock bags) plus presence of installation and support vessels.	These activities have the potential to create localised hydromorphological, biological, water quality and INNS effects within the coastal water body.

Table 1-5 Project Activity and Potential Impact Mechanism During Operation

Activity	Potential mechanisms for impact on WFD quality elements
Presence of cable ducting	Changes in infiltration to the groundwater body. Changes to groundwater flows associated with the installation of buried infrastructure, which has the potential to change subsurface flow routes and change the distribution of groundwater, both of which could impact on groundwater quantity.
Presence of infrastructure (Landfall Substation and Grid Connection Substation)	Changes in infiltration to the groundwater body (groundwater quantity) and potential for ingress of road-related contaminants (groundwater quality). Changes to groundwater flows associated with the installation of surface infrastructure, which has the potential to change surface and subsurface flow routes and change the distribution of groundwater.

70. A screening exercise has been undertaken to identify whether the water bodies identified in **Section 1.5.2** has the potential to be impacted by the activities described in **Section 1.3**.

71. Both the Ynys Mon Groundwater Body – as it underlies the entire project area – and Caernarfon Bay North water body – which experiences a direct overlap – have been identified as having the

potential to be impacted by the Project and have therefore been carried forward to Stage 2 scoping assessment.

1.6. STAGE 2: SCOPING

72. This section presents the results of the scoping assessment undertaken on the water bodies identified in **Section 1.5.2** of this report. The assessment examines the potential for activities associated with the Project to impact upon WFD quality elements and overall water body status and determines if further assessment is required (Stage 3 detailed compliance assessment).

73. Due to the slight differences in approach between assessing groundwater bodies and coastal water bodies, these have been considered in two separate sections below.

1.6.1. Groundwater Bodies

1.6.1.1. Construction Impacts

1.6.1.1.1. Groundwater Quantity

74. There is a possibility that the hydraulic regime of the local area will be affected by the Project. Backfilling the cable trench with less compacted soil could potentially influence the groundwater regime by altering porosity and creating preferential groundwater flow paths. However, the mitigation measures in place and the temporary nature of the works will minimise the potential for impacts on groundwater levels and flows.

75. **Table 1-6** presents the results of the screening exercise which showed that due to the small scale of the construction works in relation to the overall size of the groundwater body, as well as the shallow excavation to only 1.7 m taking place mostly within an existing road; there is no potential for significant impacts to the quantity of the groundwater body, and therefore this receptor can be scoped out of further assessment.

Table 1-6 Onshore Construction Activities: Scoping Questions for Groundwater Quantity

Parameter	Scoping question	Answer	Justification
Groundwater quantity	Will the activity change groundwater levels, affecting Groundwater Dependent Terrestrial Ecosystems (s) or dependent surface water features?	No	The small scale nature of the construction works in relation to the overall size of the water body means there is little potential for impact on groundwater levels.
	Will the activity lead to saline intrusion?	No	Excavations along the length of the cable route will be limited to a maximum depth of approximately 1.7 m, and any water abstraction will be limited to dewatering of the working cable trench. There is therefore no mechanism for activities along the cable route to result in saline intrusion. There is potential that HDD will be used at the landfall, there is little mechanism for saline intrusion due to the nature of the site being along a coastline with cliffs. Where

Parameter	Scoping question	Answer	Justification
			HDD will be taking place at the Grid Connection Substation closer to sea level, there is a small potential for saline intrusion to occur. However, this will be extremely localised and short term only whilst construction works are taking place. In addition, no abstractions will be taking place.
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	No	The only extraction will be dewatering from the cable trench, which is likely to be re-infiltrated to groundwater. Therefore, no impacts on groundwater quantity will occur.
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	No	No additional surface water bodies will be created as a result of the scheme
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the fully licensed quantity and the limit imposed by the total recharge?	No	The only abstraction likely to occur will be dewatering from the cable trench, which is likely to be re-infiltrated to the groundwater. Therefore no impacts on groundwater quantity will occur.

1.6.1.1.2. Groundwater Quality

76. Mechanisms for impact to groundwater quality include the excavation of surface layers during construction, allowing increased infiltration of rainwater and surface run-off to the subsurface which could mobilise any residual contamination already present in overlying strata. There is potential for polluting substances and activities to be introduced during construction works through concrete pouring works, storage of fuels and chemicals, and leaks and spills of fuel and oil from construction plant. These impacts will be minimised by the use of embedded mitigation measures, and as such are not expected to change groundwater quality in the onshore works area.

77. There is potential for drilling fluids used during HDD to leak along the drill path, or from the immediate area, which could cause contamination of groundwater. In addition, there may be a need for piling to provide foundations for the Landfall Substation. Piling has the potential to create preferential pathways through a low permeability layer allowing potential contamination of an underlying aquifer. The impacts are predicted to be of local spatial extent (occurring only at trenchless crossing locations and at the Landfall Substation if pilling is required) and of intermittent occurrence. Any impacts would be managed by embedded mitigation measures and are therefore not expected to affect groundwater chemistry.

78. Mitigation measures will include a Construction Environmental Management Plan (CEMP) which will be developed for the construction activities adhering to industry good practise as detailed in the Construction Industry Research and Information Association (CIRIA)'s 'Control of water pollution from construction sites: Guidance for consultants and contractors (C532)' (2001). In

addition, Guidance for Pollution Prevention (GPPs) from NRW, Scottish Environment Protection Agency and the Northern Ireland Environment Agency; specifically, GPP5 should be adhered to.

79. The CEMP will include measures to control sediment supply and specific measures relating to pollution prevention including concrete and cement mixing and washing areas being located at least 10 m away from the nearest watercourse, and all fuels, oils and lubricants being stored in impermeable bunds with at least 110 % of the stored capacity. In addition, drilling fluids will be inert (e.g. bentonite) and will therefore not contaminate the groundwater or adversely impact upon groundwater quality elements.

80. **Table 1-7** shows the results of the screening exercise for groundwater quality, which shows that due to the small scale nature of the works in relation to the size of the water body, and with the implementation of embedded mitigation measures as outlined above, there will be no significant impact on groundwater quality, and it can therefore be scoped out of further assessment.

Table 1-7 Onshore Construction Activities: Scoping Questions for Groundwater Quality

Parameter	Scoping question	Answer	Justification
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	No	The mitigation measures including a CEMP with specific measures to prevent pollution, as outlined above, will prevent pollution from entering the water body. In addition the scale of the works in relation to the water body will reduce the potential for impact at a water body scale.
	Will the activities have the potential to result in pollution of groundwater dependent terrestrial ecosystems (GWDTEs) or other dependent surface water features?	No	
	Will the activity lead to saline intrusion?	No	Excavations along the length of the cable route will be limited to a maximum depth of approximately 1.7 m, and any water abstraction will be limited to dewatering of the working cable trench. There is therefore no mechanism for activities along the cable route to result in saline intrusion. There is potential that HDD will be used at the landfall, there is little mechanism for saline intrusion due to the nature of the site being along a coastline with cliffs. Where HDD will be taking place at the Grid Connection Substation closer to sea level, there is a small potential for saline intrusion to occur. However, this will be extremely localised and short term only whilst construction works are taking place. In addition, no abstractions will be taking place.
	Will the activities have the potential to cause deterioration in the quality of a drinking water abstraction?	No	There are no public water supplies being abstracted from the aquifer within 250 m of the works.

	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	No	There will be no potential for a long term increase in pollutant trends as a result of the works, as only minor ongoing maintenance works may be required. Potential impacts during construction will be managed through the CEMP.

1.6.1.2. Operation Impacts

81. The operational infrastructure and associated maintenance activities do not have the potential to impact upon the quantity or quality of groundwater. Although there is potential for the presence of the buried cable ducting throughout the cable route to impact upon the quantitative status of the groundwater bodies which underlie the Project, the size of the cable ducting in comparison to the size of the groundwater bodies which underlie the Project will result in a negligible impact upon infiltration rates, groundwater flows, subsurface flow routes and alterations in the distribution of groundwater. Furthermore, there are no mechanisms for impact upon the quantitative quality elements of groundwater as demonstrated in **Table 1-8**.

Table 1-8 Project Operation and Maintenance: Scoping Questions for Groundwater Bodies

Parameter	Scoping question	Answer	Justification
Groundwater quantity	Will the activity change groundwater levels and affect GWDTEs or dependent surface water features?	No	Once operational, the Project is unlikely to have any impact on groundwater flows or quantity due to the small scale of the Project in relation to the groundwater body.
	Will the activity lead to saline intrusion?	No	There will no mechanism for saline intrusion once the Project is operational. Any groundworks associated with HDD that occurs during construction will have been reinstated, preventing saline intrusion from occurring.
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	No	No additional abstraction is expected to be carried out.
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	No	No additional surface water body will be created.
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?	No	No additional abstraction is expected to be carried out.
	Will the activity result in additional groundwater depletion of surface water flows that will exceed any groundwater body scale headroom between Fully	No	

Parameter	Scoping question	Answer	Justification
	Licensed depletion and the Limit imposed by the total low flows resource?		
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	No	A drainage strategy will be incorporated into the design of the Project and will prevent any diffuse pollution by removing any pathway by which it could occur.
	Will the activities have the potential to result in pollution of GWDTEs or other dependent surface water features?	No	
	Will the activity lead to saline intrusion?	No	There will no mechanism for saline intrusion once the Project is operational. Any groundworks associated with HDD that occurs during construction will have been reinstated, preventing saline intrusion from occurring.
	Will the activities have the potential to cause deterioration in the quality of a drinking water abstraction?	No	A drainage strategy will be incorporated into the design of the Project and will prevent any diffuse pollution by removing any pathway by which it could occur. Therefore, no deterioration in drinking water quality could occur, and there will be no increasing trend in pollution concentrations.
	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	No	

1.6.1.3. Summary

82. **Section 1.6.1** and **1.6.1.2** show that both construction and operational impacts can be scoped out of further assessment for groundwater quality and quantity as no deterioration in either receptor will occur as a result of the Project.

1.6.2. Coastal Water Bodies

83. The following **Table 1-9** present the findings of the WFD scoping assessment for coastal water bodies.

Table 1-9 Project Construction: Scoping Questions for Coastal Water Bodies

Parameter	Scoping question	Answer	Risk Issues
Hydromorphology of Caernarfon Bay North Coastal Water Body	Could the construction works impact on the hydromorphology (for example morphology or tide patterns) of a water body at HIGH status?	No	Caernarfon Bay North water body does not have HIGH status
	Could the construction works impact on the hydromorphology of any water body?	No	The proposed works, in particular deployment of Tidal Energy Converters (TEC's), foundations and cables/cable protection (rock bags have the potential to create localised

Parameter	Scoping question	Answer	Risk Issues
			hydromorphological effects. However, these have been assessed in the accompanying EIA and no significant impacts are predicted.
	Do the works fall within a water body that is heavily modified for the same use as the works?	No	No for the relevant Coastal Water Body (Caernarfon Bay North)
Biology (habitats) of Caernarfon Bay North Coastal Water Body	Is the footprint of the construction works 0.5 km^2 or larger?	Yes	The overall MDZ array and export cable covers an area of 39.76 km^2.
	Will the construction works footprint affect 1 % or more of the water body's area?	Yes	The total area of the MDZ array and export cable corridor that lies within this waterbody is 15.8 km^2 which equates to 11.6 % of the overall 135.2 km^2 area of this waterbody
	Will the construction works be within 500 m of any higher sensitivity habitat?	Yes	Some of the proposed Project infrastructure that will be deployed within the MDZ array will potentially be located within 500 m of Annex I biogenic and bedrock reef habitats.
	Will the construction works affect 1 % or more of any lower sensitivity habitat?	Yes	The total footprint of Project infrastructure that would be deployed for the full 240 MW capacity will affect >1 % of lower sensitivity habitats within the MDZ array and cable corridor, including gravel/shingle, rocky shore, subtidal rocky reef.
Biology (fish) within Caernarfon Bay North Coastal Water Body	Do the construction works fall within an estuary where they could affect fish in the estuary, outside the estuary or could delay or prevent fish entering it or migrating through the estuary?	No	The MDZ array and cable corridor does not lie adjacent to any major river estuaries. Whilst it is likely that migratory fish, in particular salmonids may pass through the site as part of migration to/from rivers in this region, assessments within the Morlais EIA have concluded that no significant impacts would arise on such fish behaviour.
	Could the construction works impact on normal fish behaviour such as movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)?	Yes	A range of commercial fish species occur in and around the MDZ site, all of which will utilise parts of the site for feeding and in some cases, spawning and/or nursery grounds.
	Could works cause entrainment or impingement of fish?	Yes	The presence of TEC's and associated sub-sea infrastructure has the potential to cause entrainment of fish and fish may also collide with sub-surface structures and TEC's.
Water quality (physical/ biological) within Caernarfon Bay North Coastal Water Body	Could works affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	Yes	The installation of subsea cable in areas where seabed sediments occur (particularly in the nearshore region), will lead to potential impacts on water quality via increased suspended sediments.
	Do the works fall within a water body with a	No	Waterbody phytoplankton status not known. However, noting the highly dynamic nature of

Parameter	Scoping question	Answer	Risk Issues
	phytoplankton status of moderate, poor or bad?		the main MDZ area and coastal location, poor-moderate phytoplankton status is not predicted and this potential impact assessment is scoped out.
	Are the works in a water body with a history of harmful algae	No	No information available on whether this waterbody has a history of harmful algae but with respect to the part of the waterbody in which the MDZ array and cable corridor overlaps, harmful algae are not predicted due to the highly dynamic nature of the main MDZ area and its exposed coastal location. Therefore, this potential impact assessment is scoped out.
Water Quality (Chemical) within Caernarfon Bay North Coastal Water Body	Will the construction works use or release chemicals through sediment disturbance or building works, and if so are these on the Environmental Quality Standards Directive (EQSD) list, or will sediment with contaminants above Cefas Action Level 1 be disturbed?	No	The Marine Water and Sediment Quality chapter of the Morlais ES (**Chapter 8, Marine Water and Sediment Quality**) reviewed the potential for contaminated sediments to be mobilised via any aspect of the offshore part of the Project and concluded that: Sediment contamination within the MDZ is low, due to the dynamic hydrological regime and generally low level of industrial activity in this region. The low proportion of fine sediments within the MDZ (which have a greater adsorbing capacity for contaminants) is another factor that indicates low sediment contamination levels; Even though mobilisation of the relatively limited amount of sediments in the MDZ will occur via construction works, none of these sediments are known to have high levels of contaminants, which will result in a negligible magnitude of effect. The sensitivity of receptors in this area to water quality changes is low, therefore a negligible impact is predicted on general water quality in the MDZ via release of contaminated sediments.
	Will the construction works involve the use of a mixing zone (like a discharge pipeline or outfall), and if so are the chemicals released on the Environmental Quality Standards Directive (EQSD) list	No	No discharge pipeline or outfall is associated with the offshore elements of the Project.
	Are the construction works within 2 km of any WFD protected area	Yes	The following WFD Protected Areas overlap or lie within 2 km of the Project area: • North Anglesey Marine SAC; • Anglesey Terns SPA; and • Porth Dafarch Bathing Water
Invasive Non-Native Species (INNS) within Caernarfon Bay	Is there potential that the construction works will introduce or spread INNS?	Yes	During the construction stages of the MDZ, there is the potential for the introduction and spread of INNS, particularly as Anglesey is considered a focal point for INNS due to a

Parameter	Scoping question	Answer	Risk Issues
North Coastal Water Body			high number of hotspots around its coast. The colonial ascidian *Didemnum vexillum*, was recorded in Holyhead Port in September 2008, representing the first confirmed record of the species on the British mainland. This recorded sparked concern due to the potential vigorous growth which could occur in both artificial aquaculture facilities and in the natural environment. There are several mechanisms by which vessels associated with the Project may introduce INNS to waters within and around the MDZ: • Attached to equipment such as anchors/anchor chains; • Fouling on hulls; • Seawater in pipework; and • Ballast water and within sediment within ballast tanks.

1.6.3. Summary

84. The embedded control measures described in **Chapter 17, Water Resources and Flood Risk** of the ES as embedded mitigation measures will prevent deterioration in status and adverse impacts on the Ynys Mon Groundwater body. There are no specific mitigation measures identified for the water body, therefore it can be concluded that the Project will not prevent the implementation of the WFD objectives.

85. The results of the scoping exercise undertaken for Caernarfon Bay North Coastal Water Body are summarised in **Table 1-10** below.

Table 1-10 Summary of Scoping Exercise for Caernarfon Bay North Coastal Water Body

Receptor	Potential risk to receptor?	Water body / WFD Protected Area identified	Risk issues for impact assessment
Hydromorphology	Yes	Caernarfon Bay North (Coastal)	Localised scour due to placement of cable (rock) protection
Biology: habitats	Yes	Caernarfon Bay North (Coastal) ▪ cobbles, gravel and shingle; ▪ rocky shore; ▪ subtidal boulder fields; ▪ subtidal rocky reef; ▪ polychaete reef.	Temporary disturbance and permanent loss of seabed habitats.
Biology: fish	Yes	Caernarfon Bay North (Coastal)	Disruption to migratory fish due to sediment plumes
Water quality (physical/biological)	Yes	Caernarfon Bay North (Coastal)	NA
Water quality (chemical)	No	Caernarfon Bay North (Coastal)	NA

Receptor	Potential risk to receptor?	Water body / WFD Protected Area identified	Risk issues for impact assessment
Protected areas	Yes	▪ North Anglesey Marine SAC; ▪ Anglesey Terns SPA; and ▪ Porth Dafarch Bathing Water.	Impact on designated sites
Invasive non-native species	Yes	Caernarfon Bay North (Coastal)	Introduction via rock dumping and/or O&M vessels

1.7. STAGE 3: DETAILED COMPLIANCE ASSESSMENT

86. This section presents the results of the detailed compliance assessment undertaken on the Caernarfon Bay North Coastal Water Body identified a potentially experiencing impacts in **Section 1.6.3**.

1.7.1. Hydromorphology

87. This assessment is based upon those presented in **Chapter 7, Metocean Conditions and Coastal Processes**.

88. The specific WFD related issue of relevance is: *"could the activity significantly impact the hydromorphology of any water body*". For the purpose of this assessment potential impacts on the tidal, wave and seabed sediment regime in and around the MDZ site due to the placement of Project infrastructure are presented below to define hydromorphological impacts.

1.7.1.1. Tidal Regime

89. Once installed within the MDZ, tidal devices have the intention of affecting the baseline tidal regime due to the extraction of energy from the tidal currents. This will result in the formation of wakes within the hydrodynamic current flow arising from each tidal device within the Project. The overall effect will be to (mainly) pacify the existing tidal regime downstream of the tidal devices, when compared to the pre-existing (baseline) situation, recognising that the location of this wake will change along the axis of tidal flow depending on the stage of the tide. Wake effects have been visually observed at the water surface on previous tidal device deployments (e.g. SeaGen deployment in Strangford Lough, Northern Ireland). There could also be some (less significant) local increases in current speed between the wakes of adjacent tidal devices and/or around some of the foundations or support structures within the site.

90. The changes caused by the tidal devices and their foundations or support structures could lead to a modification of the tidal regime downstream of an individual tidal device (device scale), downstream of a sub-zone occupied by a small array of tidal devices (near-field scale) or across the whole demonstration site and beyond (far-field scale).

91. To investigate this issue, numerical modelling was used to determine the changes in the baseline tidal regime arising from the worst-case scenario. The modelling was undertaken principally to assess the effects of tidal energy resource extraction on the levels of resource available to adjacent projects within the MDZ.

92. Overall, the modelling results showed that there is a predicted increase in the effect on baseline tidal conditions with increasing capacity of the arrays within the sub-zones of the MDZ. The

effects occur: (i) local to individual devices; (ii) from one array to another array within the MDZ; and (iii) from the MDZ to surrounding areas of sea bed.

93. The zone of influence of effect tends to follow the axes of baseline tidal flows, extending northeast beyond the MDZ on a flood tide and south-southeast beyond the MDZ on an ebb tide.

94. However, in even the worst-cases, the magnitude of reduction in tidal current flow (up to 0.8 m/s) results in a residual current flow of high speeds, because the baseline flow conditions in these most affected areas are typically greater than 2 m/s.

95. Based on the qualitative and quantitative modelling assessments the likely magnitudes of effect are shown in **Table 1-11** below.

Table 1-11 Magnitude of Effects on Tidal Regime Due to the Presence of Structures in the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Device	Medium	High	Medium	Negligible	Medium
Near-field	Low - Medium	High	Medium	Negligible	Low - Medium
Far-field	Negligible	High	Medium	Negligible	Negligible

96. Based on the above, there will be a medium magnitude of effect on tidal regime around each device itself, but this will reduce to low-medium and negligible in the near and far-fields respectively.

1.7.1.2. Wave Regime

97. Once installed within the MDZ, tidal devices and their associated foundations or support structures may have the potential to affect the baseline wave regime. This would be most notable for devices with foundations/support structures that occupy the greatest height within the water column and present the greatest cross-sectional area as a solid mass, causing the greatest potential for blockage.

98. The changes caused by the tidal devices and their foundations or support structures may lead to a modification of the wave regime downstream of an individual tidal device and its foundation or support structure (device scale), downstream of a sub-zone occupied by a small array of tidal devices (near-field scale) or across the whole demonstration site and beyond (far-field scale). To further investigate this issue, experience from the offshore wind farm industry is drawn upon.

99. For monopiles, wave theory exists which relates the pile diameter (D) to the wavelength (L) of the incident waves. Diffraction effects become important when $D/L \geq 0.2$. Using wavelengths typical of the demonstration site, which is often characterised by long period Atlantic swell, wave diffraction is not envisaged to be induced at the MDZ by a monopile foundation. This confirms that effects on the wave regime from a monopile would be confined to local scale reflections and blockage, and that the wave trains will regroup and return to baseline values within a short distance from each foundation.

100. For Gravity Base Structures (GBS), which are likely to represent the worst-case foundation type due to their occupation of a greater cross sectional area within the water column, there is a strong evidence base which demonstrates that the changes in the wave regime due to the

presence of foundation structures (even under a worst-case scenario of the largest diameter GBS considered by the offshore wind farm industry to date), are relatively small in magnitude (typically less than 10 % of baseline wave heights in close proximity to each wind turbine, reducing with greater distance from each turbine). Such effects are predicted to be even smaller for GBS associated with tidal devices due to the smaller size of these GBS compared to those used in the offshore wind industry. Effects are localised in spatial extent, extending as a shadow zone typically up to several tens of kilometres from the site along the axis of wave approach, but with low magnitudes (only a few percent change across this wider area). This is confirmed by a review of modelling studies from over 30 offshore wind farms in the UK and European waters (Seagreen 2012), existing guidance documents (ETSU 2000; ETSU 2002; Lambkin et al. 2009), published research (Ohl et al. 2001) and post-installation monitoring (Cefas 2005).

101. Based on the qualitative and quantitative modelling assessments the likely magnitudes of effect are shown in **Table 1-12** below.

Table 1-12 Magnitude of Effects on Wave Regime Due to the Presence of Structures in the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Device	Medium	High	Medium	Negligible	Medium
Near-field	Low	High	Medium	Negligible	Low
Far-field	Negligible	High	Medium	Negligible	Negligible

102. Based on the above, there will be a medium magnitude of effect in wave regime around each device itself, but this will reduce to low and negligible in the near and far-fields respectively.

1.7.1.3. Sediment Transport Regime

103. Changes in the sediment transport regime will arise as either: (i) an indirect effect, consequent upon changes in the tidal and/or wave regimes caused by tidal devices and their foundations; or (ii) a direct effect due to blockage of (bedload) sediment transport by the foundations of tidal devices or electrical hubs on the sea bed within the Project.

104. As the magnitude of impacts on the tidal regime (Operational Impact 1) and wave regime (Operational Impact 2) are negligible across the far-field, then the associated knock-on effects on sediment transport will also be negligible across the far-field.

105. At a device scale, the worst-case for potential blockage of (bedload) sediment transport by foundations is associated with a GBS anchors for floating systems. However, at the MDZ site there is little mobile sediment available for bedload transport. This is because the sea bed has been swept to bedrock (with or without a gravel, cobble, boulder lag) by strong tidal currents. Given this dominant process, the potential for interruption or disturbance of sediment transport by the foundations and electrical hubs is limited. The greatest potential effect will arise in the immediate vicinity of the sand ridge in the north of the MDZ and the area of megaripples in the south and southwest of the MDZ. However, it is unlikely that any Project infrastructure will present such an obstacle to sediment transport locally that far-reaching effects will become manifest.

106. Based on the qualitative and quantitative modelling assessments the likely magnitudes of effect are shown in **Table 1-13** below.

Table 1-13 Magnitude of Effects on Sediment Transport Regime Due to Presence of Structures in the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Device	Low	High	Medium	Negligible	Low
Near-field	Negligible	High	Medium	Negligible	Negligible
Far-field	Negligible	High	Medium	Negligible	Negligible

107. Based on the above, there will be a low magnitude of effect on the seabed transport regime around each device itself, reducing to negligible in the near and far-fields.

1.7.1.4. Summary

108. Overall, even though some very localised (device-level) effects on the hydromorphological conditions within the Caernarvon Bay North coastal waterbody are predicted via the EIA work done for the Project, none of these will produce a significant, non-temporary effect at the scale of the waterbody. Therefore, no deterioration in the status of this waterbody is predicted via a change in hydromorphological conditions.

1.7.2. Biology – Habitats

109. The assessments within this section have been drawn upon from those undertaken within **Chapter 9, Benthic and Intertidal Ecology**. Please refer to this chapter for detailed assessments. A worse-case scenario assessment has been conducted in all cases.

110. The installation of Project infrastructure, including anchor systems for tidal devices, seabed mounted devices, hubs and cables/cable protection, will all result in temporary habitat disturbance to seabed habitats within the main MDZ array site and the export cable corridor. Under the worst-case scenario, an area of up to 423,499 m^2 (0.42 km^2) would be temporarily disturbed due to construction associated activities such as post-lay burial of cable through the large sandwave feature present in the site and installation of an anchor barge to allow for device installation.

111. This would result in the temporary disturbance of a 1.06 % of the seabed within the MDZ array and export cable corridor.

112. Based on the biotope mapping conducted by OEL (Ocean Ecology, 2018), the site is covered by a high percentage of the biotopes CR.HCR.FaT, CR.HCR.XFa, CR.MCR.CSab and SS.SCS.CCS. Following the process of assigning each biotope to a Valued Ecological Receptor (VER) group, habitat group 9 (High energy infralittoral and circalittoral rock/ coarse sediment with Annex I stony/bedrock reef) and 10 (Circalittoral Sabellaria reefs – Annex I biogenic reefs) were the most frequently occurring groups in the subtidal region. These groups contain possible Annex I reef habitats (biogenic, bedrock and stony). In the OEL survey report, observations of Annex I stony reef habitat (as per Irving 2009) frequently overlain by varying coverage of S. spinulosa tube aggregations (representative of Annex I biogenic reef were observed in deeper areas of the survey site (as per Gubbay 2007)). The amount of overlying sediment was reduced

in the slightly shallower waters in central, southern and northern areas where tide-swept and mixed faunal turf community representative of Annex I bedrock reef were prevalent. Within this assessment of temporary habitat loss, VER habitat group 9 and VER habitat group 10 have been assessed.

113. Given the high percentage coverage of similar habitat types available within the MDZ and the low level of overall temporary habitat disturbance or loss that will occur in the construction phase, this impact is of a scale which would be barely noticeable from monitoring and would occur only occasionally. Therefore, the magnitude of this effect was assessed as low.

114. Habitat group 10 represents the group which contains possible areas of biogenic Annex I reef (Sabellaria spp.). Within the MarLIN assessment for abrasion and disturbance assessment, this habitat is assessed with a medium sensitivity, as abrasion at the surface of S. spinulosa reefs is considered likely to damage the tubes and result in sub-lethal and lethal damage to the worms. However, it should be noted that this assessment was suggested as relatively precautionary and it should be noted the degree of resilience will be mediated by the character of the impact. The recovery of small areas of surficial damage in thick reefs is likely to occur through tube repair and may be relatively rapid.

115. Considering the current knowledge of *S. spinulosa* reef ecology it is evident that such habitat follows a cycle of evolution and degradation within periods of months (evolution of functioning reefs has been recorded within a 6-month period) and demonstrates a high degree of recoverability following direct impacts (Pearce et al., 2007; Hendrick et al., 2011; Last et al., 2011).Therefore, it is unlikely that if any reef is impacted, that the consequent direct impacts will be long-lived i.e. the reef habitat demonstrates a high recoverability.

116. Based on advice provided by Natural England (Advice on Operations) for The Wash and North Norfolk Coast SAC (as this site contains Annex I stony reef), stony reefs are associated with a medium sensitivity in relation to cable laying activities. Within this assessment, no assessments on sensitivity were available for bedrock and a low sensitivity has been concluded. An overall medium sensitivity has been assessed for VER habitat group 9 and VER habitat group 10.

117. As the VERs have been assessed with an overall medium sensitivity and the magnitude of the impact is low, physical disturbance and overall temporary disturbance of subtidal habitats was concluded to result in a minor adverse impact.

118. In terms of permanent habitat loss produced via the placement of Project infrastructure, a worst-case area of up to 2,184,932 m^2 (2.18 km^2) of seabed would be lost due to placement of Project infrastructure. This includes a maximum design and worst case scenario of a loss of a possible 2,055,000 m^2 due to the swept area of the catenary cables associated with many of the devices (including this value (m^2) of seabed habitat subject to chain disturbance in the calculations of permanent habitat loss is a very precautionary approach as this area will not be permanently covered by Project infrastructure in the same way that parts of the site where foundations/cables are installed will be. Rather, this area will be subject to regular disturbance via chain movement. However, it is presented here, and not in temporary habitat disturbance values as the latter assumes a short-term, temporary effect, whereas this effect via chain movements will occur for the lifetime of the Project).

119. Given the worst-case scenario seabed footprint for a maximum design of the MDZ could result in the loss of up to 2,184,932 m^2, a worst-case scenario design would result in the loss of a 5.49 % of the seabed within the MDZ and export cable corridor.

120. The subtidal area of the MDZ is dominated by the biotopes CR.HCR.FaT, CR.HCR.XFa, CR.MCR.CSab and SS.SCS.CCS which fall within the Valued Ecological Receptors habitat group 9 (High energy infralittoral and circalittoral rock/coarse sediment with Annex I stony/bedrock reef) and 10 (Circalittoral Sabellaria reefs – Annex I biogenic reefs), while the intertidal zone is dominated by the VER habitat group 1 (high energy littoral rock) and habitat group 12 (yellow and grey lichens on supralittoral rock).

121. It has not been possible to provide an accurate calculation of the loss of each VER due to the current unknown location of devices and therefore VERs which will be impacted. Although there is a high percentage coverage of similar habitat types within the MDZ available, the scale of the change would be noticeable due to an overall habitat loss of 5.49 %. This impact will occur at a scale which would be noticeable from monitoring but would remain within the range of natural variations of background conditions. Further, the effect is slowly reversible following decommissioning (5-10 years) and therefore has a medium level magnitude has been assigned.

122. Based on MarLIN assessments, as discussed within impact 1, medium sensitivity has been applied to the most sensitive receptors (VER habitat group 9 and 10) and the most frequently occurring within the intertidal zone (VER habitat group 1 and 12).

123. Therefore, as a medium magnitude and a medium sensitivity to the receptors, an overall moderate significant impact has been assessed for the permanent loss of habitat due to the placement of infrastructure from the Project.

124. With the successful implementation of mitigation measures including the use of pre-construction surveys to check for the presence of any rare or protected habitats and species and to then look to micro-site key project infrastructure, this impact could be reduced to minor adverse.

125. Potential impact on seabed habitats may also arise via temporary increases in suspended sediments during construction, accidental release of pollutants and introduction of INNS (see below). None of these are predicted to create anything more than minor adverse impacts.

1.7.2.1. Summary

126. Overall, even though impacts on seabed habitats within the MDZ and cable corridor are predicted, and thus impacts on habitats within the Caernarvon Bay North coastal waterbody, none of these will produce a significant, non-temporary effect at the scale of the waterbody. Therefore, no deterioration in the current status of this waterbody is predicted via a change in biological (habitat) conditions.

1.7.3. Biology – Fish

127. The assessments within this section have been drawn upon from those undertaken within **Chapter 10, Fish and Shellfish Ecology.** Please refer to this chapter for detailed assessments. A worse-case scenario assessment has been conducted in all cases.

128. Potential impacts on fish from the Project include loss of feeding/spawning/nursery habitat via placement of project infrastructure, barrier effects and collision risk with active tidal devices.

129. The same values for permanent habitat loss as defined above for biology (habitats) apply for the permanent loss of potential feeding/spawning and nursery grounds.

130. The loss of 2.1 km^2 of habitat via the MDZ infrastructure will not produce a significant impact on any fish species found in this waterbody as similar habitats are widespread throughout the surrounding regional waters.

131. In terms of potential barrier effects and/or collision with active TECs, it is very difficult to assess the magnitude of these effects due to the absence of information from projects off this scale. However, it can be assumed that if fatal collisions do occur, it is likely to only be to a small proportion of individuals and not result in a population level effect. The loss of individuals, in the context of the total loss of individuals for a population, is considered to be within the natural levels of mortality due to other factors, therefore the magnitude of the effect at a population is considered to be very low/negligible.

132. According to the impact matrix the combination of a low sensitivity and a very low/negligible magnitude results in a negligible impact significance. However, due to the uncertainty over this assessment, the impact significance has been augmented to minor adverse as a precautionary measure.

133. As a result of the low magnitude of the effect in coupled with the medium sensitivity of the receptor there is a minor adverse impact on fish receptors during operation via barrier/collision effects.

1.7.3.1. Summary

134. Overall, even though impacts on fish receptors are predicted, and thus impacts on fish within the Caernarvon Bay North coastal waterbody, none of these will produce a significant, non-temporary effect at the scale of the waterbody. Therefore, no deterioration in the current status of this waterbody is predicted via a change in biological (fish) conditions.

1.7.4. Water Quality (Physical / Biological)

1.7.4.1. Water Clarity (Sediment Plumes)

135. The following assessment is supported by the information presented within **Chapter 7, Metocean Conditions and Coastal Processes.** Throughout the construction phase of the Project there is potential for foundation installation activities to disturb sediments, either from the seabed surface or from below the seabed (depending on foundation type). This disturbance can release sediment into the water column as a plume, suspended sediment concentrations can increase in the water column, making it more turbid, until the plume becomes dispersed by tidal current action and the sediments settle once again on the seabed.

136. Within the MDZ there is a paucity of surface sediment, with tide-swept bedrock prevailing. Where sediment does exist in these areas, it is sparse, and predominantly gravel, cobbles and rock

boulders. These particle sizes are so large that they either cannot be suspended in the water column or will drop from suspension within a few centimetres from location of disturbance.

137. The total volume of sediment released from pre-drilling for monopile or pin pile installation would be extremely small (1,020 m^3 per foundation). From experience of other schemes, this is likely to result in peak increases in suspended sediment concentration at the points of release within the Project being only a few mg/l (typically less than 10 mg/l) and peak values at only a short distance from each release point reducing rapidly to less than 1 mg/l.

138. This low (barely measurable) effect is partly due to the low volume of sediment released from drilling at the location of each release point; and partly because any fine material released would be rapidly dispersed by the strong tidal currents along the axis of tidal flow.

139. The maximum envisaged effect associated with sediment plumes arising from the foundation installation activities will cause only very minor enhancements in suspended sediment concentration (typically less than 1 mg/l a short distance from the release point) over only a small geographical area (a few hundred metres).

1.7.4.2. Phytoplankton

140. The activities associated with the construction, operation and decommissioning of the Project are not anticipated to affect the local or regional phytoplankton as no nutrients are anticipated to be released. Furthermore, the increased SSC from sediments suspended from the seabed are anticipated to be temporary in nature and are not anticipated to affect phytoplankton communities significantly.

1.7.4.3. Nutrients and Microbiology

141. Throughout the construction phase of the Project there is potential for foundation installation activities to disturb sediments, either from the seabed surface or from below the seabed (depending on foundation type). This disturbance can release previously deposited nutrients or microbial pathogens, i.e. *E. coli* into the waterbody.

142. Due to the highly dynamic, coastal nature of the MDZ site and export cable corridor, levels of harmful nutrient accumulations and/or microbial pathogens do not occur in the areas where construction works will be undertaken.

1.7.4.4. Summary

143. Overall, there is no deterioration in the current status of this waterbody is predicted via a change in water quality (physical/biological) conditions in terms of Water clarity, phytoplankton or nutrients and microbiology.

1.7.5. WFD Protected Areas

144. As discussed within **Section 8.5.3,** the MDZ (and ECC) is located within the North Anglesey Marine SAC (harbour porpoise) and the Anglesey Terns SPA (classified population of foraging terns during the breeding season). These protected sites have been subjected to a HRA screening process to determine the potential for a Likely Significant Effect (LSE) with respect to

the conservation objectives, and to determine the potential for an Adverse Effect on the Integrity of the site (AEoI).

145. A Habitats Regulation Assessment (HRA), including, where appropriate, a shadow appropriate assessment, has been undertaken for the Project. This has considered the potential for the proposed Project to adversely affect the integrity of a range of designated sites. With respect to the North Anglesey Marine SAC and the Anglesey Terns SPA (the two sites within 2 km of the Project), this assessment concluded that none of the impact pathways screened into Stage 2 of the HRA have the potential individually, or when considered together, to either compromise the conservation objectives, or cause an adverse effect on site integrity of these two sites.

146. The MDZ also lies <2 km from Porth Dafarch designated bathing beach.

147. With respect to Porth Dafarch designated bathing beach, potential exists for the status of water quality at this beach to be adversely affected via deterioration in water quality/release of contaminants due to construction activities. However, the impact assessments presented in **Chapter 8, Marine Water and Sediment Quality** have concluded that no significant impacts on water quality are predicted via planned works. Therefore, it is judged that the magnitude of any effect is low.

148. The sensitivity of this receptor (Porth Dafarch designated bathing beach) is judged to be medium as it has a formal EU-level designations that require regular monitoring and compliance with. Therefore, a minor adverse impact is predicted on this designated beaches via deteriorations in water quality during construction or operation of the Project. Therefore, **no deterioration in the current status** of this waterbody is predicted via a change in the status of this WFD Protected Area.

1.7.6. Invasive Non-Native Species (INNS)

149. The assessments within this section have been drawn upon from those undertaken within **Chapter 9, Benthic and Intertidal Ecology**, please refer to this chapter for detailed assessments. A worst case scenario has been used in all cases.

150. During the construction stages of the MDZ, there is the potential for the introduction and spread of invasive non-native species (INNS), particularly as Anglesey is considered a focal point for INNS due to a high number of hotspots around its coast. The colonial ascidian *Didemnum vexillum*, was recorded in Holyhead Port in September 2008, representing the first confirmed record of the species on the British mainland. This recorded sparked concern due to the potential vigorous growth which could occur in both artificial aquaculture facilities and in the natural environment.

151. The development of infrastructure within the site presents new surface areas for colonisation by a variety of species, including INNS. This therefore has potential to alter the benthic species and communities in the offshore site. Although it is hard to predict the species that will potentially colonise these structures, they will likely be similar to those that are already within the various biotopes across the MDZ subtidal area, as the hard structures will be similar to the hard bedrock and stony reefs within the area. Therefore, the impacts of introduction of hard substrates into an

already largely hard sediment dominated area will not be as significant as the impacts of the introduction of hard substrates into a predominately soft sediment environment.

152. Embedded mitigation and applying best-practice techniques to minimise the risk of the introduction of non-native species will present a project operation in which it is very unlikely that the introduction of non-native species to the area would occur. Possible mitigation measures are proposed to minimise the risk of INNS and their successful invasion within the MDZ and wider region, including compliance with relevant guidance regarding ballast water and a consideration of a full risk assessment to identify possible further mitigation measures once project vessels have been identified. An agreed monitoring and management plan may be required to be developed in consultation with NRW. An outline INNS Management Plan is provided with this application (**Document MOR/RHDHV/DOC/0075, outline INNS Management Plan**).

1.7.6.1. Summary

153. Taking into account the high level of existing hard substrates within the Caernarfon Bay North coastal waterbody, the presence of INNS and the proposed management of INNS is not predicted to present a possible deterioration of the Caernarfon Bay North coastal waterbody receptor.

1.8. CONCLUSION

154. An assessment has been undertaken of the potential for impacts predicted to arise during the construction, operational and decommissioning phases of the Project and its associated onshore infrastructure to lead to a deterioration in the status of relevant local waterbodies designated under the WFD.

155. Following the scoping process set out in relevant WFD compliance assessment guidance, a series of potential impacts were assessed. The basis of assessments were detailed impact assessments presented for key EIA topics in the Morlais ES.

156. The MDZ and export cable corridor lie within the Caernarfon Bay North Coastal waterbody which currently has a Good status for all key classification parameters. The landfall and onshore infrastructure overlap with the Ynys Môn Secondary Aquifer Groundwater Body which currently has Good status for both quantity but poor chemical status; however, this was scoped out of further assessment following the Stage 2 screening exercise which identified that there is no potential for deterioration in quality or quantity of groundwater resulting from the Project.

157. Even though impacts are predicted on key indicators of WFD waterbody status (biology, water quality etc.) for Caernarfon Bay North Coastal Water Body, none of these are judged to be of sufficient magnitude to lead to a deterioration in status of any of the receptors assessed in this report.

1.9. REFERENCES

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