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Morlais Project
Environmental Statement

Appendix 8.1: Water Framework Directive Compliance Assessment Addendum

Volume III

Applicant: Menter Môn Morlais Limited

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Appendix 8.1: WFD Compliance Assessment

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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
DBEIS	Department for Business, Energy and Industrial Strategy.
DCO	Development Consent Order
DfT	Department for Transport
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, 1 nautical mile from the Mean High Water Spring tide limit. 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 supporting 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 supporting 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 NRW ‘Guidance for assessing activities and projects for compliance with the Water Framework Directive’ guidance. 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 established 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.). The Shellfish Waters Directive has since been fully repealed and shellfish waters are protected under the WFD.

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 water body 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 water body 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 informed by both OGN 72 and the EA's Clearing the Water for All guidance.

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.	
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 km^2, plus associated onshore infrastructure contained within an onshore development area of 1 km^2. 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 (NRW, 2018).

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. Those considered most relevant to the Project are:

- NRW (2018): Guidance for assessing activities and projects for compliance with the Water Framework Directive;
- 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;
- Any groundwater bodies that underlie the Project; and
- Any water bodies outside of the project area, but where there are potential pathways for effect.

1.4.1.2. Scoping

40. 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.

41. 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.

42. 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.

43. The coastal water bodies are assessed, under the NRW OGN 72 guidance, we regard to the following six receptors:

- Hydromorphology;

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

44. 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**.

45. 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

46. 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 assessment must consider whether the activity will directly or indirectly lead to introduction of specific pollutants or hazardous substances which cause the quality element to achieve good chemical status.

47. Deterioration is defined as:

> "*when the status of at least one quality element reduces by one class or more, even if that fall does not result in the classification of the body of surface water as a whole. If a quality element is already at the lowest status class then a measurable and meaningful within-class deterioration counts as deterioration*" (NRW, 2018).

48. 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 water body 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 water body, 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 water body'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 water body/ waterbodies with a phytoplankton status of moderate, poor or bad; or
- Whether the water body/ 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 hydrologically connected to both the onshore and offshore project area, against which potential impacts on WFD compliance will be assessed. 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 water body that overlaps spatially with the zone of influence for any pressure identified in the Project ES; 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 A8-1** 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

WFD Parameter	Caernarfon Bay North	Ynys Mon Central Carboniferous Limestone	Holyhead Bay	Holyhead Strait
Water Body ID	GB621010380000	GB41001G204200	GB681010360000	GB681010450000
River Basin District Name	Western Wales	Western Wales	Western Wales	Western Wales
Water Body Type	Coastal	Groundwater	Coastal	Coastal
Water Body Total Area (km2)	135.21	623.22	11.71	7.3

WFD Parameter	Caernarfon Bay North	Ynys Mon Central Carboniferous Limestone	Holyhead Bay	Holyhead Strait
Overall Water Body Status (2015)	Good	Poor	Moderate	Moderate
Ecological Status	Good	n/a	Moderate	Moderate
Chemical Status	Good	Poor	Fail (Fluoranthene, Benzo(a)pyrene, Mercury and its compounds	Good
Target Water Body Status and Deadline	Good by 2015	Good by 2021	Good by 2027	Good by 2021
Hydromorphology Status of Water Body	Supports Good	Information not available	Information not available	Supports Good
Heavily Modified Water Body?	No	No	Yes. Navigation, ports and harbours	No
Phytoplankton Status	Information not available	Information not available	High	Information not available
History of Harmful Algae?	Information not available	Information not available	Information not available	Information not available

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 A8-1**. 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 relevant 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;
- Porth Dafarch Bathing Water; and
- Beddmanarch Bay Shellfish Water.

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.
Beddmanarch Bay Shellfish Water	Does not overlap with the MDZ	Designated under the WFD for economically significant species. Beddmanarch Bay supports bed culture mussels which are harvested by dredging.

1.5.4. Potential Impacts of the Project

67. 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.

68. 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. Secondary impacts to coastal water bodies arising from construction activities such as sediment runoff from site preparation, earthworks and construction associated with onshore infrastructure.

Activity	Potential mechanisms for impact on WFD quality elements
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.

69. 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**.

70. The Ynys Mon Groundwater Body (as it underlies the entire project area), the Caernarfon Bay North water body (which experiences a direct overlap), and the Holyhead Bay and Holyhead Strait water bodies (which are situated adjacent to areas of terrestrial construction activities), 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

71. 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).

72. 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

73. 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.

74. **Table 1.6** presents the results of the scoping exercise, and demonstrates 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 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	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.

Parameter	Scoping question	Answer	Justification
	limit imposed by the total recharge?		

1.6.1.1.2. Groundwater Quality

75. 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.

76. 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.

77. 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.

78. 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.

79. **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

80. 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 Licensed depletion and the Limit imposed by the total low flows resource?	No	
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.

Parameter	Scoping question	Answer	Justification
	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

81. **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

82.

83. **Table** 1.9 and Error! Reference source not found. present the findings of the WFD scoping assessment for coastal water bodies. The offshore works lie within the Caernarfon Bay North water body, and no direct or indirect pathways from offshore works were found to extend outside this water body. Further details of the Project Zone of Influence are provided within each receptor assessment in Stage 3.

Table 1.9 Project Construction: Scoping Questions for Coastal Water Bodies

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	**Risk Issues**	**Answer**	**Risk Issues**	**Answer**	**Risk Issues**
Hydromorphology	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	No	Holyhead Strait water body does not have High status therefore this aspect can be scoped out of further assessment.	No	Holyhead Bay water body does not have High status therefore this aspect can be scoped out of further assessment.
	Could the construction works impact on the hydromorphology of any water body?	Yes	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 hydromorphological effects.	No	The only potential pathway is via increased sediment supply resulting from construction works on land (as outlined in **Table 1.4**) entering the coastal water body via surface water runoff. However, mitigation measures included in the Code of Construction Practice (CoCP) will prevent the release of sediment into the surface watercourses that drain the construction area before entering the coastal water body, therefore preventing a hydromorphological impact to the coastal water body.	No	The only potential pathway is via increased sediment supply resulting from construction works on land (as outlined in **Table 1.4**) entering the coastal water body via surface water runoff. However, mitigation measures included in the Code of Construction Practice (CoCP) will prevent the release of sediment into the surface watercourses that drain the construction area before entering the coastal water body, therefore preventing a hydromorphological impact to the coastal water body.
	Do the works fall within a water body that is heavily modified	No	No for the relevant coastal water body (Caernarfon Bay North)	No	No for the relevant coastal water body (Holyhead Strait) – no works are taking place in this water body.	No	No for the relevant coastal water body (Holyhead Strait) – no works are taking place in this water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
	for the same use as the works?						
Biology (habitats)	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.	No	No overlap between the construction works and Holyhead Strait coastal water body.	No	No overlap between the construction works and Holyhead Bay coastal water body.
	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 water body is 15.8 km^2 which equates to 11.6 % of the overall 135.2 km^2 area of this water body	No	No overlap between the construction works and Holyhead Strait coastal water body.	No	No overlap between the construction works and Holyhead Bay coastal water body.
	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.	No	No offshore works are taking place in the Holyhead Strait coastal water body.	No	No offshore works are taking place in the Holyhead Bay coastal water body.
	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.	No	No offshore works are taking place in the Holyhead Strait coastal water body.	No	No offshore works are taking place in the Holyhead Bay coastal water body.
Biology (fish)	Do the construction	No	The MDZ array and cable corridor does not lie	No	The MDZ array and cable corridor does not lie adjacent	No	The MDZ array and cable corridor does not lie adjacent

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
	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?		adjacent to any major river estuaries. Whilst 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.		to any major river estuaries. Whilst 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.		to any major river estuaries. Whilst 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.
Water quality (physical/ biological)	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.	No	The only potential pathway is via increased supply of sediment and contaminants resulting from construction works on land (as outlined in **Table 1.4**) entering the coastal water body via surface water runoff. However, mitigation measures included in the Code of Construction Practice (CoCP) will prevent the release of sediment and contaminants into the surface watercourses that drain the construction area before entering the coastal water body, therefore preventing an impact to the physico-chemistry and biology of the coastal water body.	No	The only potential pathway is via increased supply of sediment and contaminants resulting from construction works on land (as outlined in **Table 1.4**) entering the coastal water body via surface water runoff. However, mitigation measures included in the Code of Construction Practice (CoCP) will prevent the release of sediment and contaminants into the surface watercourses that drain the construction area before entering the coastal water body, therefore preventing an impact to the physico-chemistry and biology of the coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	**Risk Issues**	**Answer**	**Risk Issues**	**Answer**	**Risk Issues**
	Do the works fall within a water body with a phytoplankton status of moderate, poor or bad?	No	Water body phytoplankton status not known. However, noting the highly dynamic nature of the main MDZ area and coastal location, poor-moderate phytoplankton status is not predicted and this potential impact assessment is scoped out.	No	No works are taking place within the Holyhead Strait coastal water body.	No	No works are taking place within the Holyhead Bay coastal water body.
	Are the works in a water body with a history of harmful algae	No	No information available on whether this water body has a history of harmful algae but with respect to the part of the water body 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.	No	No works are taking place within the Holyhead Strait coastal water body.	No	No works are taking place within the Holyhead Bay coastal water body.
Water Quality (Chemical)	Will the construction works use or release chemicals through sediment disturbance or	No	The Marine Water and Sediment Quality chapter of the Morlais ES (**Chapter 8, Marine Water and Sediment Quality**) reviewed the potential for contaminated	No	Mitigation measures included in the CoCP and outlined in **Chapter 17, Water Resources and Flood Risk** will prevent the supply of sediment and contaminants through surface runoff into	No	Mitigation measures included in the CoCP and outlined in **Chapter 17, Water Resources and Flood Risk** will prevent the supply of sediment and contaminants through surface runoff into

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
	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?		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		surface water bodies, and therefore entering the coastal water body. In addition, construction best practice measures will prevent the risk of contamination from construction processes and machinery. Therefore, this potential impact can be scoped out for the Holyhead Strait coastal water body.		surface water bodies, and therefore entering the coastal water body. In addition, construction best practice measures will prevent the risk of contamination from construction processes and machinery. Therefore, this potential impact can be scoped out for the Holyhead Bay coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
			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.	No	No discharge pipeline or outfall is associated with the offshore elements of the Project.	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; • Beddmanarch Bay Shellfish Water; and • Porth Dafarch Bathing Water However, the lack of mechanisms for onshore activities to affect the coastal water bodies described above means that the Protected Areas are not expected to be affected.				
Invasive Non-Native Species (INNS) within Caernarfon Bay North Coastal Water Body	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 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 record 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:				

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	**Risk Issues**	**Answer**	**Risk Issues**	**Answer**	**Risk Issues**
			• Attached to equipment such as anchors/anchor chains; • Fouling on hulls; • Seawater in pipework; and • Ballast water and within sediment within ballast tanks.				

Table 1.10 Project Operation: Scoping Questions for Coastal Water Bodies

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
Hydromorphology of Caernarfon Bay North Coastal Water Body	Could Project operations impact on the hydromorphology (for example morphology or tide patterns) of a water body at High status?	No	Hydromorphological changes are predicted to occur within a limited spatial extent, and entirely within the Caernarfon Bay water body (see 1.7.1 for full details). Caernarfon Bay North water body does not have High status.	No	No significant impacts to the hydromorphology of terrestrial water bodies during operation predicted (**Chapter 17, Hydrology and Flood Risk**), therefore no mechanism for hydromorphological impacts to coastal water bodies.	No	No significant impacts to the hydromorphology of terrestrial water bodies during operation predicted (**Chapter 17, Hydrology and Flood Risk**), therefore no mechanism for hydromorphological impacts to coastal water bodies.
	Is the Project 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)	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
Biology (habitats) of Caernarfon Bay North Coastal Water Body	Is the footprint of the Project site 0.5 km^2 or larger?	Yes	The overall MDZ array and export cable covers an area of 39.76 km^2.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
	Will the Project 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 water body is 15.8 km^2 which equates to 11.6 % of the overall 135.2 km^2 area of this water body	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
	Is the Project within 500 m of any higher	Yes	Some of the proposed Project infrastructure that will be deployed within the MDZ array will potentially	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
	sensitivity habitat?		be located within 500 m of Annex I biogenic and bedrock reef habitats.				
	Will the Project 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.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
Biology (fish) within Caernarfon Bay North Coastal Water Body	Could the Project 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	The turbine presence may potentially cause disturbance due to physical presence.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
	Is the Project situated within an estuary where they could affect fish in the estuary, outside the estuary or	No	The MDZ array and cable corridor does not lie within or adjacent to any major river estuaries. Whilst migratory fish, in particular salmonids may pass through the site as part of	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
	could delay or prevent fish entering it or migrating through the estuary?		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 Project 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.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
Water quality (physical/ biological) within Caernarfon Bay North Coastal Water Body	Could the Project affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	No	During operation there will be no further risk of impacts on water quality.	No	No significant impacts to the water quality parameters of terrestrial water bodies during operation predicted (**Chapter 17, Hydrology and Flood Risk**), therefore no mechanism for water quality impacts to coastal water bodies via surface runoff.	No	No significant impacts to the water quality parameters of terrestrial water bodies during operation predicted (**Chapter 17, Hydrology and Flood Risk**), therefore no mechanism for water quality impacts to coastal water bodies via surface runoff.
	Is the Project located within a water body with a phytoplankton status of	No	Water body phytoplankton status not known. However, noting the highly dynamic nature of the main MDZ area and coastal location,	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	**Risk Issues**	**Answer**	**Risk Issues**	**Answer**	**Risk Issues**
	moderate, poor or bad?		poor-moderate phytoplankton status is not predicted and this potential impact assessment is scoped out.				
	Is the Project in a water body with a history of harmful algae	No	No information available on whether this water body has a history of harmful algae but with respect to the part of the water body 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.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.
Water Quality (Chemical) within Caernarfon Bay North Coastal Water Body	Is the Project 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; • Beddmanarch Bay SFW; and • Porth Dafarch Bathing Water However, the lack of mechanisms for onshore activities to affect the coastal water bodies described above means that the Protected Areas are not expected to be affected.				
Invasive Non-Native Species (INNS) within Caernarfon Bay	Does the Project present risk of introduction or spread INNS?	Yes	Introduction of turbine devices will increase the area of flat hard surfaces which may be colonised by INNS.	No	No operational infrastructure within the Holyhead Strait coastal water body.	No	No operational infrastructure within the Holyhead Bay coastal water body.

Parameter	Scoping question	Caernarfon Bay North		Holyhead Strait		Holyhead Bay	
		Answer	Risk Issues	Answer	Risk Issues	Answer	Risk Issues
North Coastal Water Body							

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. They also include measures to prevent impacts to the hydromorphological and water quality elements of terrestrial water bodies, this will then prevent indirect impacts arising in coastal waterbodies due to runoff from onshore construction or operational activities.

85. There are no specific mitigation measures identified for the Ynys Mon Groundwater Body, or the Holyhead Strait and Holyhead Bay Coastal Water Bodies, therefore it can be concluded that the Project will not prevent the implementation of the WFD objectives.

86. The results of the scoping exercise undertaken for Caernarfon Bay North Coastal Water Body are summarised in **Table 1.11** below.

Table 1.11 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)	Presence of tidal devices has potential to affect wave and tidal regimes and associated sediment transport.
Water quality (chemical)	No	Caernarfon Bay North (Coastal)	NA
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

87. This section presents the results of the detailed compliance assessment undertaken on the Caernarfon Bay North water body.

1.7.1. Hydromorphology

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

89. 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

90. Once installed within the MDZ, tidal devices will affect 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.

91. 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).

92. 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 (see HR Wallingford modelling report, document reference DER6261-RT001-R01-00 and Numerical Modelling Supplementary Note, document reference MOR/RHDHV/DOC/0111).

93. Modelling results were determined to illustrate the effects of the operating turbines on average and maximum flows (depth averaged) during a mean spring tide at Holyhead. A 0.1-0.2 m/s reduction in average flow speed was seen within the immediate vicinity of the MDZ (9.35 km^2), whilst a very small are of increased average flow is apparent at the mouth of Gogarth Bay, to the east of the MDZ (0.1-0.2 m/s increase over an area of 0.37 km^2). Although a reduction in average speed in excess of this (>0.2 m/s) may occur, this will be limited to a very small spatial extent (0.05 km^2).

94. Impacts from turbine presence on maximum flow speed were shown to be larger in magnitude and further reaching (Figure A8-2). The zone of influence 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.

95. Changes in peak flow velocity in excess of the alteration to average flow speed described above (i.e. ≥0.2m/s) are predicted over an area of 10.48 km². However, these changes are predominantly small in magnitude; reductions of ≥0.4 m/s are only predicted to occur over an area of 1.43 km² (corresponding to 1.06% of the Caernarfon Bay North water body).

96. Changes in tidal velocity are limited to within the Caernarfon Bay North water body. The magnitude of change is generally small and limited to the immediate vicinity of the MDZ array. 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 is 2.2-2.4 m/s. Due to this residual high speed, and the small spatial extent of predicted change, it is not considered to represent a change in hydrodynamic characteristics of the Caernarfon Bay North water body.

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. Due to the long period of Atlantic swell, wave diffraction from turbine structures is not expected. Effects on the wave regime will be confined to local scale reflections and blockage. As such, wave trains will regroup and return to baseline values within a short distance from each foundation.

99. Wave modelling has been completed to predict impact from turbine presence on wave climate under representative and extreme wave conditions (see HR Wallingford modelling report, document reference DER6261-RT001-R01-00 and Numerical Modelling Supplementary Note, document reference MOR/RHDHV/DOC/0111). Results were produced from five different directions to provide an overview of the full range of waves which may interact with the tidal energy structures (210°N, 240°N, 270°N, 300°N and 330°N.).

100. The presence of tidal devices is expected to cause a reduction in wave height and a slight and highly localised change in direction. Modelling outputs confirm that the structures cause waves from all directions to reduce due to dissipation of wave energy. Predicted changes in wave height were highly localised around the turbine array and limited to within the Caernarfon Bay North water body.

101. For all directions, there is a greater proportional change in wave heights in the representative conditions than those in extreme conditions. Extreme waves have a larger period then the representative conditions, and as such, a smaller proportion of the total wave period is blocked by the turbine structures. As more wave energy is passing the devices, it is to be expected that the structures will have proportionately less effect on waved during extreme conditions.

102. In addition to modelling of changes in wave height due to turbine presence, consideration has been given to likely impacts on wave regime from modelled worst-case flow. Currents can affect

wave climate through refraction effects and when opposing currents cause wave shoaling or wave blocking. The effects of currents differ throughout the tidal cycle and with wave direction.

103. In all cases, the effects on wave height from changes in currents due to the presence of turbines are smaller in magnitude but occur over a larger spatial extent than the direct impact on wave height from the structures alone. It is likely that the actual change will be a combination of these effects and thereby less severe than the outputs described. However, in order to present a worst-case scenario with regards to extent of water body impacts, details of spatial effect of current driven change in wave height is provided below.

104. The greatest magnitude of change in wave hight from changes in current is predicted is for waves from 330°N, where a decrease of 0.4-0.65 m may occur across an area of 0.67 km².The predicted magnitude of change is smaller for waves originated a more southerly direction (210°N: up to 0.4-0.5 m across an area of 0.34 km²) and for all other directions no change of ≥0.4m is predicted. This is likely to result from the presence of Holy Island blocking further wave propagation. However, for all wave directions, the spatial extent of change is low (change ≥±0.2 m: 210°N=5.3 km²; 240°N=2.19 km²; 270°N=0.45 km²; 300°N=0.41 km²; 330°N=2.17 km²).

105. Turbine influenced changes in currents produce strongest effects on waves from 210°N and 240°N. Within the MDZ, where current speed is reduced, wave height is also lower due to a reduction in shoaling effect. However, as described in Section 1.7.1 an increase in current speed is predicted to the east and west of the MDZ. In these locations wave height is increased due to shoaling. The extent to which the described effects occur differ with wave direction. Whilst waves from 210°N and 240°N exhibit distinct areas of increase and decrease in wave height, both positive and negative changes in waves from 270°N are small in spatial extent and magnitude. Waves from 300°N and 330°N are associated with a mainly decrease in wave heights, with only very small areas of low magnitude increase.

106. Predicted changes in wave height due to turbine presence are low for all wave directions. The greatest magnitude of change is predicted for waves from 330°N, where a decrease of 0.4-0.65 m may occur across an area of 0.67 km², and the largest predicted extent for change in wave height ≥±0.2 m is 5.3 km² (210°N). These changes correspond to 0.48% and 3.91% of the Caernarfon Bay North Waterbody extent respectively. Given this limited extent, the predicted change is not considered to constitute a change in overall water body hydromorphological characteristic.

1.7.1.3. Sediment Transport Regime

107. Changes in the sediment transport regime may 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.

108. The HR Wallingford (2020) modelling report (Document Number DER6261-RT001-R01-00)) provides model-based prediction of changes to sediment transport rates. The model was based on full representative and extreme wave climate, wave driven currents and tidal flow, was run with and without the operating turbines, and the results compared to determine impacts. The

model was simulated over a full spring neap cycle. In addition, simulations over three consecutive spring tides were completed for five set of representative wave conditions based on Met Office Remap monitoring data.

109. A reduction in current velocity caused by turbine drag will lead to a decrease in sediment transport rates close to the turbine structures. However, the flow velocities offshore from the MDZ, and between the shore and MDZ are higher and will cause an increase in the residual transport. The presence of tidal turbine structures is predicted to result in both positive and negative changes equivalent to ≤10% of the natural residual sediment transport, which corresponds with ≤5-10% of the gross sediment transport. Impacts are limited to the immediate footprint of the MDZ, west of Holy Island and entirely within the Caernarfon Bay North water body. Positive or negative variation in sediment transport >250m²/year is expected over area of 3.47 km², corresponding with 2.57% of the Caernarfon Bay North water body (see Figure A8-3).

110. Fluctuations in sediment transport rate may affect the formation and movement of seabed features. Predicted changes in sediment transport were used to determine likely change in seabed level. Small changes in bed level is expected west of Holy Island which may cause slight reduction to the present day rate of sand wave movement at the South Stack banner bank. However, the spatial extent of any modification is predicted to be small; variation ≥0.1 m/day is predicted across an area of 1.37 km², corresponding to 1.01% of the Caernarfon Bay North water body (see Figure A8-4). Given the small extent of change, it is not expected to be detectable over natural climate driven variation.

111. In addition to these offshore tidally driven changes in sediment transport, changes in wave height due to turbine presence has potential to impact the shoreline and bays on the west of Holy Island. Closer to the coast wave stirring and wave driven currents are the primary force driving sediment transport. Modelled outputs show that although sediment transport within Gogarth Bay may increase by 10-20%, this bay is comprised of exposed bedrock and there is little mobile sediment; thus, no impact is expected. A reduction in sediment transport is expected within Abraham's Bosom, which may lead to a small change in beach orientation. However, this change will be small and is not expected to be detectable above natural variation in beach orientation caused by fluctuation in the wave climates.

112. The predicted changes in the sediment transport regime are small in spatial extent and magnitude. These are not expected to be measurable above natural climate driven variation and as such do not pose a risk of deterioration to the Caernarfon Bay North WFD status.

1.7.1.4. Decommissioning

113. Project decommissioning will involve removal of tidal devices and is expected to result in a reversal of the changes described for installation. Long term predictions of the status of the Caernarfon Bay North water body are not realistic. However, given the small spatial extent and magnitude of the predicted changes, these are not expected to pose risk of deterioration in status or failure to achieve WFD objectives.

1.7.1.5. Summary

114. Overall, even though some very localised effects on the hydromorphological conditions within the Caernarfon Bay North water body are predicted, the potential effect on the WFD water body would be small in magnitude and spatial extent. In view of this, no deterioration in the status of this water body is predicted via a change in hydromorphological conditions. The MDZ development will not cause any non-temporary adverse effect on the WFD coastal water body nor in connecting water bodies.

1.7.2. Biology – Habitats

115. 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.

116. 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.

117. This would result in the temporary disturbance of a 1.06 % of the seabed within the MDZ array and export cable corridor. This area constitutes 0.31% of the Caernarfon Bay North WFD water body.

118. Based on the biotope mapping conducted by OEL (2018), the site contains a high percentage of the following biotopes: mixed faunal turf communities (A4.13); very tide-swept faunal communities (A4.11); circalittoral *Sabellaria* reefs (on rock) (A4.22); and circalittoral coarse sediment (A5.14).

119. The deeper areas of the site are characterised by coarse sediments representative 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 in some areas (as per Gubbay, 2007) (A4.22). 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 communities, representative of Annex I bedrock reef were prevalent. Closer to shore circalittoral coarse sands and gravels dominate.

120. Within the MarLIN assessment for abrasion and disturbance assessment, biogenic Annex I reef (*Sabellaria* spp.) habitat is assessed as having medium sensitivity. 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.

121. 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.

122. 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.

123. Figure A8-5 illustrates regional biotopes across the extent of the Caernarfon Bay North water body. The broad scale biotope data is provided by EMODnet data[1] and is of lower spatial resolution than detailed site specific data used to map the MDZ Project footprint (see OEL, 2018). Comparison of biotope classification within the Project footprint shows that the areas classified as A4.11 and A4.13 in the OEL data are combined into the higher classification level of A4.1 in Figure A8-5. In addition, within the EMODnet data A4.22 has been incorporated within A5.14. This amalgamation should not be surprising given that the OEL report mapped many of these areas as A5.14/A4.22 due to the frequent presence of both habitats together. Due to these limitations in biotope resolution, when making comparisons between biotope extent within the MDZ and equivalent overall extent of similar habitat within the water body as a whole, A4.1 should be considered to encompass both A4.11 and A4.13, and A4.22 is considered representative of both A4.22 and A5.14.

124. The EMODnet mapping data shows that 18.11% of the Caernarfon Bay North water body can be classified as A4.1 (38.53 km²) and 24.01% is A5.14 (51.10 km²). As such, it is considered that within the Caernarfon Bay North water body, there is extensive areas of benthic habitat similar to that within the MDZ. Given this high coverage of similar habitat types and the low level of temporary habitat disturbance or loss that will occur during construction, this impact will make a negligible difference to benthic habitats within the Caernarfon Bay North water body. Installation disturbance will only occur during the construction phase of the Project, and benthic habitats would recover during the operational phase. Therefore, the magnitude of this effect was assessed as low.

125. 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

[1] Information derived from data that is made available under the European Marine Observation Data Network (EMODnet) Seabed Habitats initiative (http://www.emodnet-seabedhabitats.eu/), financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund

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).

126. Given the worst-case scenario seabed footprint for a maximum design of the MDZ could result in the loss of up to 2,18 km^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. This extent represents 1.61% of the Caernarfon Bay North WFD water body.

127. It is not possible to provide an accurate calculation of the loss of the specific biotopes present within the MDZ due to the lack of certainty regarding location of devices and therefore biotopes which will be impacted. However, as described above, each of the four benthic habitats present within the MDZ are considered to be widespread regionally. This availability of alternative similar habitat provides benthic communities with opportunity to migrate following disturbance and provides capacity for recovery and recolonisation of any affected substrate following Project decommissioning. Although these biotopes occupy extensive areas across the Caernarfon Bay North water body, the 1.61% extent represents proportion of water body extent and may be greater or less for each specific biotope. As such, the changes are likely to be measurable above baseline conditions, but are expected to remain within the range of natural variations. Further, the effect is slowly reversible following decommissioning (5-10 years) and therefore has a medium level magnitude has been assigned.

128. The Project will implement 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. It is expected that these measures will further reduce the potential for adverse impacts on benthic habitats within the Caernarfon Bay North water body.

129. 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). However, given the small spatial and temporal extent, these are not expected to cause measurable changes at the water body scale.

1.7.2.1. Decommissioning

130. Decommissioning works will involve the removal of Project infrastructure. Although this will inevitably lead to direct (excavation works) and indirect (elevated SSC) seabed disturbance, the scale and magnitude of change is expected to be broadly in line with construction activities.

131. The presence of the MDZ will not result in change to the underlying seabed composition. As such, removal of tidal devices will be associated with a direct replacement of benthic habitats lost during construction. These habitats are widespread regionally and therefore it is expected that they will be recolonised relatively rapidly.

132. In view of the small spatial scale and magnitude of change, and the recoverability of benthic habitats, decommissioning works are not expected to pose risk of deterioration in status or failure to achieve WFD objectives

1.7.2.2. Summary

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

1.7.3. Biology – Fish

134. 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.

135. Potential impacts on fish from the Project include barrier effects and collision risk with active tidal devices. Although fish are not considered as quality elements for coastal water bodies, any impacts to migratory fish would need to be considered in hydrologically connected estuarine and river water bodies.

136. 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 from collisions, in the context of overall mortalities within a population, is considered to be within the natural levels of mortality. The magnitude of the effect at a population is considered to be very low/negligible and therefore there is no risk of impact to hydrologically connected estuarine and river water bodies.

1.7.3.1. Decommissioning

137. Decommissioning works will involve the removal of tidal turbines. This will eliminate any barrier effects/collision risks created by Project installation. As such, these works are not considered to pose a risk of adverse impacts to fish populations.

1.7.3.2. Summary

138. Overall, even though impacts on fish receptors are predicted, these are considered to be negligible in scale and thus pose no threat to migratory fish populations passing through Caernarfon Bay North to hydrologically connected estuarine and river water bodies.

1.7.4. Water Quality (Physical/Biological)

1.7.4.1. Water Clarity (Sediment Plumes)

139. 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.

140. 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.

141. 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 will reduce to <1 mg/l within a small spatial extent (a few hundred metres).

142. 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.

143. 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). Due to the small magnitude and spatial extent of these impacts, changes to water clarity are considered to pose a negligible risk of deterioration to the good status of the Caernarfon Bay North water body.

144. Note that, as discussed in **Table 1.9** and **Table 1.10**, the runoff of sediment from terrestrial construction and operational activities will be controlled by a suite of best practice mitigation measures (as outlined in the CoCP and drainage strategy). These will prevent an increase in sediment supply and avoid impacts on the coastal water bodies that receive drainage from the onshore site.

1.7.4.2. Phytoplankton

145. Mobilisation of suspended sediments by construction activities has potential to introduce dissolved and particulate matters (organic and inorganic), thereby causing an indirect increase in phytoplankton productivity. The activities associated with the construction, operation and decommissioning of the MDZ Project are not anticipated to affect the local or regional phytoplankton as no nutrients are anticipated to be released. Furthermore, the increased suspended sediment concentration (SSC) from sediments suspended from the seabed are anticipated to be temporary in nature and are not anticipated to affect phytoplankton communities significantly. As such, Project construction, operation and decommissioning are not expected to cause any non-temporary effects on phytoplankton communities and are not considered to pose a risk of deterioration to the good status of the Caernarfon Bay North water body.

1.7.4.3. Nutrients and Microbiology

146. 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 water body.

147. Due to the high energy, 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. As such, Project construction operations are not considered to pose a risk of deterioration to the good status of the Caernarfon Bay North water body.

1.7.4.4. Summary

148. Overall, there is no deterioration in the current status of this water body 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

149. 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).

150. 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.

151. The MDZ also lies <2 km from Porth Dafarch designated bathing beach. A potential exposure pathway 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, there is no evidence of contaminated sediments within the MDZ Project footprint. 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 and any change will not cause deterioration of the good status of the Caernarfon Bay North water body.

1.7.6. Invasive Non-Native Species (INNS)

152. 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.

153. 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.

154. 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.

155. Vessel ballast water transfer is recognised as posing a risk of INNS introduction. by The International Convention for the Control and Management of Ships Ballast Water and Sediments (BWM Convention) was adopted in 2004 and was implemented in 2017. The introduction of this treaty provided international regulations to control the transfer of potentially invasive species. In accordance, ships are now required to manage their ballast water.

156. 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

157. Taking into account the extensive presence of existing hard substrates within the Caernarfon Bay North water body, existing regulations on ballast water management and the proposed agreement of biosecurity measures, the introduction/spread of INNS is not expected to pose a risk of deterioration to the Good status of the Caernarfon Bay North water body.

1.8. BEDDMANARCH BAY SHELLFISH WATER

158. As discussed in **Table 1.9** and **Table 1.10**, the runoff of sediment and contaminants from terrestrial construction and operational activities will be controlled by a suite of best practice mitigation measures embedded into the scheme design (e.g. in the CoCP and site drainage system). These will prevent an increase in the supply of sediment and contaminants into the

coastal water bodies that receive drainage from the onshore site, and therefore prevent any adverse impacts on the Beddmanarch Bay Shellfish Water.

1.9. CUMULATIVE/IN-COMBINATION ASSESSMENT

159. Natural Resources Wales guidance on assessing compliance with the Water Framework Directive (2018) recommends that assessments should consider potential for cumulative and in-combination effects. The guidance defines in-combination effects as additive effects, where the same pressures from separate plans or projects combine to increase risk of deterioration of a WFD quality element. Cumulative impacts are subtly different in that these are where the synergistic effect of several separate pathways from distinct small-scale schemes cause deterioration of a WFD quality element. The main driver for this assessment is to ensure that the cumulative or in-combination effects are monitored and if necessary, mitigated.

160. Assessment should include developments that are at various stages of the consenting process:

- Recently completed; insufficient time since construction for environmental effects to be fully understood;
- Under construction;
- Permitted, but not yet constructed;
- Submitted applications where the decision has not yet been determined; and/or
- Projects identified in plans or guidance as reasonably likely to come forward.

161. A long list of forthcoming projects was produced for the Project Cumulative, Transboundary and In-Combination Impact Assessment (Volume III, Chapter 26). Additional reference has been made to the NRW record of Marine Licence applications (NRW, 2020) and the Planning Inspectorate (2020). Given that impacts from the MDZ are predicted to be limited to the Caernarfon Bay North water body, projects are only considered for cumulative/in-combination assessment where they have potential to affect this water body. Details of projects in the region of the proposed works identified as meeting these criteria are provided below. It should be noted that currently on-going and historical projects are included within the baseline environment and not within the cumulative/in-combination assessment as it is not possible to determine what the baseline conditions would be without the influence of these activities.

- Holyhead Breakwater Refurbishment Scheme (Screening);
- Holyhead Port Expansion (Application Submitted);
- Holyhead Marina (Scoping);
- Holyhead Deep (Recently Constructed).

162. All projects at the pre-application stage will not be considered in this in-combination assessment. Where little information is available it is not possible to inform an in-combination assessment against their possible impact to surrounding water bodies. The potential for cumulative or in-combination effects will be assessed as part of the environmental assessment (associated with

each of those projects) if, and when, those projects proceed to licence application stage. This determination will not affect the assessment of impacts associate with construction and operation of the MDZ; any adverse effects will be associated with the subsequent projects and addressed by those projects at the time of their assessment.

163. Of the known or reasonably foreseeable projects identified, 2 have progressed to application stage and are considered below.

164. Holyhead Port on Holy Island (Ynys Gybi) is a private port owned by Stena Line Ports Ltd. An application has been submitted for a new deep-water cruise berth. Stena Line plans to expand the Port through the reclamation of three areas to provide new berths and associated landside areas.

165. The construction of a new deep-water berth at Holyhead Port is considered to pose risk to surrounding water bodies through the following pathways:

- Disturbance of the seabed during construction;
- Direct seabed habitat loss within reclamation footprint;
- Accidental spillages of materials during construction;
- Suspended solid uplift and mobilisation of contaminated sediments during dredging activities;
- Disturbance to fish passage routes by underwater noise during construction;
- Changes to coastal processes during construction and operation.

166. Holyhead Port lies within Holyhead Bay water body. As such, cumulative or in-combination effects on the Caernarfon Bay North water body can only occur through indirect secondary effects rather than direct effects within the project footprint. For this reason, there is no interaction predicted from disturbance of seabed during construction or seabed habitat loss at the Holyhead Port site.

167. The effects of any accidental spillages of materials during construction or suspended sediment plume from dredging activities are expected to be relatively localised. Holyhead Port is >2 km from the Caernarfon Bay North water body boundary. Assessment of expected effects envelope within the Holyhead Port ES showed no interaction with the Caernarfon Bay North water body (RHDHV, 2019). Similarly, modelling of potential noise impacts within the Holyhead Port ES established that these will be limited to the Holyhead Bay water body, and disturbance to fish passage from the MDZ is considered to pose a negligible risk to migratory fish populations. As such there is negligible risk of disturbance to hydrologically connected estuarine and river water bodies.

168. Impacts to coastal processes during construction or operation activities at Holyhead Port may manifest through: morphological changes caused by seabed removal; changes to tidal prism or sediment transport due to reclamation and dredging works; changes in tidal currents and exposure of local intertidal and foreshore areas; and changes in sediment deposition within

Holyhead Bay. Holyhead Port lies >2 km from the Caernarfon Bay North water body and is sheltered by the Holyhead breakwater. Due to the sheltered location and the geographic separation, it is not expected that these changes in coastal processes would cause detectable effects at the adjacent Caernarfon Bay North water body.

169. Based on this lack of interaction between effects from the Holyhead Port development and the Caernarfon Bay North water body, there is no pathway for cumulative or in-combination impacts on WFD parameters. As a result, the scheme is considered to be compliant with WFD requirements.

170. Minesto's Holyhead Deep project is an 80 MW installation of tidal energy devices, delivered in a phased manner, and located a short distance due west of the MDZ Project. The predicted impacts of Minesto's Holyhead Deep project on coastal processes have been assessed as being not significant in their own right (Minesto, 2016), and this conclusion is considered equally valid when both projects are considered in combination.

171. Based upon the geographical configuration of the Minesto Project Development Area (PDA) with respect to the MDZ Project, there is no possibility of changes in tidal flow interacting between projects, due to the alignment of flood and ebb flows off the coast of Anglesey (i.e. the two projects are not upstream/downstream of each other).

172. Similarly, any (minor) sediment plumes arising from construction from either project will not coalesce because of:

    i. the alignment of principal tidal flows; and

    ii. likely different construction programmes (note that phase 1 of the Holyhead Deep project is already installed).

173. The predicted impacts of Minesto's Holyhead Deep project on coastal processes have been assessed as being not significant in their own right (Minesto, 2016), and this conclusion is considered equally valid when both projects are considered in combination.

1.10. CONCLUSION

174. An assessment has been undertaken of the potential for impacts predicted to arise during the construction, operational and decommissioning phases of the Project. These have been presented in relation to surrounding WFD water bodies in order to assess the potential for works to lead to deterioration of status or to jeopardise a water body achieving good status under the WFD.

175. Following the scoping process set out in relevant WFD compliance assessment guidance, a series of potential impacts were assessed. Water bodies were considered if they were found to interact with the impact zone of influence. The offshore works lie within the Caernarfon Bay North water body, and no direct or indirect pathways from offshore works were found to extend outside this water body. The Caernarfon Bay North water body 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. Any potential for indirect impacts to Holyhead Bay and Holyhead Strait Coastal Water Bodies as a result of surface water runoff during construction or operation have also been scoped out due to the implementation of mitigation measures, as outlined in **Chapter 17, Hydrology and Flood Risk**, which will prevent impacts to terrestrial water bodies, and therefore remove any mechanism for impact to coastal water bodies.

176. Impacts have been identified for key indicators of WFD water body status (wave and tidal regimes, benthic habitats etc.) for Caernarfon Bay North water body. However, all of these were found to be small in magnitude and spatial extent and do not pose a risk of deterioration to the Good status of this water body. The potential for significant cumulative or in-combination effects has been examined and none are anticipated. Based on these findings, construction, operation and decommissioning works associated with the MDZ Project are considered to be compliant with WFD requirements.

1.11. REFERENCES

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