LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Wind Farm

Environmental Statement

Volume 6: Appendix 10D – Offshore Water Framework Directive Assessment

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FLOVENTIS ENERGY

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Acronyms and abbreviations

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
BEP	Best Environmental Practice	RBD	River Basin District
BGS	British Geological Survey	RBMP	River Basin Management Plan
CEMP	Construction Environmental Management Plan	RNAGS	Reasons for Not Achieving Good Status
CJEU	Court of Justice of the European Union	SAC	Special Area of Conservation
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea	SOLAS	International Convention for the Safety of Life at Sea
DEFRA	Department for Environment Food and Rural Affairs	SOPEP	Shipboard oil pollution emergency plans
ECC	Export Cable Corridor	SSC	Suspended Sediment Concentration
EIA	Environmental Impact Assessment	SSSI	Site of Special Scientific Interest
EMF	Electromagnetic field	MCZ	Marine Conservation Zone
ES	Environmental Statement	MMO	Marine Management Organisation
EU	European Union	NAVTEX	Notices to Mariners, Kingfisher Bulletins, Navigational Telex
EUNIS	European Nature Information System	OESEA 3	Offshore Energy Strategic Environmental Assessment 3
EQSD	Environmental Quality Standards Directive	PINS	Planning Inspectorate
HDD	Horizontal Directional Drilling	PAHs	Polycyclic Aromatic Hydrocarbons
HMWB	Heavily Modified Waterbody	TEL	Tetraethyl lead
HOPI	Habitats Of Principle Importance	THC	Total Hydrocarbon Content
IMO	International Maritime Organisation	TOC	Total Organic Content
INNS	Invasive Non-Native Species	TOM	Total Organic Matter
MAGIC	Multi-agency geographical information for the countryside	TJB	Transition Joint Bay
NRW	Natural Resources Wales	TraC	Transitional and Coastal waters
OS	Ordnance Survey	WFD	Water Framework Directive

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
PLONOR	Pose Little or No Risk to the Environment	ZoI	Zone of Influence

Glossary of project terms

Term	Definition
The Applicant	The developer of the Project, Floventis Energy.
Array	All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s).
Array Area	The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located.
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB).
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
NAVAREA	The United Kingdom Hydrographic Office (UKHO) acts on behalf of the United Kingdom Government as the NAVAREA; Co-ordinator and UK National Co-ordinator for Radio Navigational Warnings within the World-wide Navigational Warning Service. As such the UKHO is the focal point for receipt and assessment of information on potential navigational hazards and issues any necessary Radio Navigational Warnings relevant to its area of responsibility. The UKHO element of providing this service is funded by the UK Government through the Ministry of Defence.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application.
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the landfall.

Term	Definition
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application.
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation.
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
Project	All aspects of the Llŷr development (i.e. the onshore and offshore components of both Llŷr 1 and Llŷr 2).
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.

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10D. OFFSHORE WATER FRAMEWORK DIRECTIVE ASSESSMENT

10.1 Introduction

10.1.1. Background

1. Llŷr Floating Wind Limited (hereafter referred to as the Applicant) is proposing to develop the Llŷr 1 Floating Offshore Wind Farm (hereafter referred to as the 'proposed Project'), located approximately 35 km off the coast of Pembrokeshire in the Celtic Sea.
2. A Water Framework Directive (WFD) Assessment relating to the offshore element of the proposed Project is presented herein. Refer to **Appendix 10C: Onshore Water Framework Directive Assessment** for an assessment of impacts on WFD water bodies related to onshore activities. The assessment has been undertaken by AECOM. Further details of the proposed Project Team's competency are provided in **Appendix 1A: Statement of Competence**.
3. The scope of this document pertains to the offshore elements of the proposed Project only. No consideration is given herein to onshore elements of the proposed Project. "Offshore" refers to the entirety of the marine environment below Mean High Water Springs.
4. New developments that have the potential to impact the current or targeted WFD status of a waterbody are required to assess their compliance against the WFD objectives of the potentially affected waterbodies. The Planning Inspectorate's Advice Note Eighteen (PINS, 2017) and the Environment Agency guidance for completing WFD assessments for coastal and transitional waters (Environment Agency, 2023), suggest that a three-stage approach should be adopted as follows:
    - Stage 1: WFD Screening;
    - Stage 2: WFD Scoping; and
    - Stage 3: WFD Impact Assessment.
5. This report presents the findings of Stages 1-3, which have been undertaken in relation to the proposed Project.

10.1.2. Overview of the proposed Project

6. An overview of the proposed Project and example of floating offshore wind technology are presented in **Chapter 01: Introduction**, **Chapter 04: Project Description** and **Volume 5: Figure 1-1, Site Location** of the proposed Project.
7. The proposed Project will comprise of the following key components, shown in **Chapter 01: Introduction, Plate 1-2:**
    - Offshore infrastructure:
        - Up to 10 WTGs, each with a maximum rotor diameter of 285 m;
        - Up to 10 associated floating platforms;
        - Up to eight mooring lines, for each floating platform (up to 80 in total);
        - Up to eight anchors or piles for each floating platform (up to 80 in total);
        - Up to 11 offshore IACs, up to 132 kiloVolts (kV) High Voltage Alternating Current (HVAC) (dynamic but with the potential to touch the seabed);
        - Up to two offshore export cable circuits, up to 132 kV HVAC with landfall achieved via Horizontal Directional Drilling HDD) at Freshwater West; and
        - Associated scour and cable protection (if required).

- Onshore infrastructure:
  - HDD compound;
  - Up to two onshore export cable circuits between the landfall and the onshore substation (of up to 132 kV), and then one from the onshore substation to the grid connection (of up to 400 kV). The total length of each onshore cable circuit will be, up to 7.1 km from landfall to grid connection point;
  - Up to two Transition Joint Bays (TJB) to connect the offshore cable circuit(s) to the onshore cable circuit(s);
  - Cable transition joint bays to connect sections of the onshore cable circuits;
  - Onshore substation 1.5 km from the grid connection point.
  - Temporary construction compounds; and
  - Access routes where necessary

10.2 Study Area

8. The offshore Llŷr Array Area is situated in the north-east Celtic Sea. The Export Cable Corridor (ECC) extends to the southwest coast of Pembrokeshire and into the Milford Haven Waterway. The ECC makes landfall at Freshwater West, where the cable route then continues across land towards the substations where connections will be made, before continuing through the terrestrial environment to reach the final destination of Pembroke Power Station (see **Chapter 18: Marine Water and Sediment Quality, Figure 18-1**). This chapter refers to the offshore environment below Mean High Water Springs. For the onshore WFD assessment refer to **Appendix 10C: Onshore Water Framework Directive Assessment**.

9. The offshore Study Area has been defined based on the extent of one spring tidal excursion limit. This is considered to represent the maximum distance that any measurable plume effects could extend to, or the maximum area for deleterious substances to disperse within, in the marine environment. A spring tidal excursion is chosen as this presents a worst-case scenario over a neap tidal excursion due to any plume or substance traveling further in the marine environment under spring tide conditions.

10. The buffer distance of this tidal excursion from the proposed Project site is typically in the order of 8 to 14 km (depending on the local peak current speed, which is typically smaller offshore and greater nearshore). This buffer is measured from the edge of the proposed Project site in the direction of the tidal axis. As a result of these tidal variations, the buffer distance differs around various sections of the proposed Project site (for example, where the proposed Project site is more aligned to the tidal axis). This buffer (known as the 'Study Area') is depicted in **Chapter 18: Marine Water and Sediment Quality, Figure 18-1**.

11. The assessment within this chapter relates only to the area contained within the Study Area. Outside of this area, it is considered that any effects on marine water quality and sediment quality would be negligible due to sufficient dispersal throughout the water column from tidal action (as outlined in **Chapter 17: Physical Environment**).

10.2.3. Structure of the report

12. The structure of this report is set out as follows:

- Section 2 provides an overview of the Water Framework Directive;
- Section 3 describes the assessment methodology;

- Section 4 considers assumptions and limitations;
- Section 5 describes baseline conditions;
- Section 6 describes the future baseline;
- Section 7 provides the screening assessment;
- Section 8 provides the scoping assessment;
- Section 9 describes the results of the WFD assessment; and
- Section 10 presents the conclusions and recommendations.

13. In addition, this assessment is supported by the following technical Annexes:

- **Annex 10D-A Further WFD waterbody information**

10.3 Overview of the Water Framework Directive

10.3.4. Legislative context

14. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, commonly referred to as the Water Framework Directive (WFD), aims to protect and enhance the water environment.

15. The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

16. Under the WFD, ‘water bodies’ are the basic management units, defined as all or part of a river system or aquifer. Waterbodies form part of a larger ‘river basin district’ (RBD), for which ‘River Basin Management Plans’ (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs are Cycle 3 that were published in 2022.

17. In Wales, Natural Resources Wales is the competent authority for implementing the WFD, although objectives are delivered in partnership with other relevant public bodies and private organisations (e.g., local planning authorities, water companies, Rivers Trusts, large private landowners and developers).

18. Natural Resources Wales is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are typically responsible for consenting activities on Ordinary Watercourses. Local planning authorities are typically responsible for highways drains, and landowners are typically responsible for ditches and watercourses within their property including piped watercourses and culverts. While Natural Resources Wales is ultimately responsible for enforcing the WFD on any waterbody, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

19. As part of its regulatory and statutory consultee role on planning applications and environmental permitting (under the Environmental Permitting Regulations (England and Wales) 2016), Natural Resources Wales and WFD-partnering organisations, must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a waterbody from its current status or potential; and / or
- Prevent future attainment of good status or potential where not already achieved.

20. In determining whether a development is compliant or non-compliant with the WFD objectives for a waterbody, Natural Resources Wales must also consider the conservation objectives of any Protected Areas (i.e., Natura 2000 sites or water dependent Sites of Special Scientific Interest (SSSI)) and adjacent WFD waterbodies, where relevant.

10.3.5. Surface waterbody status

21. Under the WFD, surface waterbody overall status is classified on the basis of chemical status and ecological status or potential.

22. Both ecological and chemical status are divided in different components for each of which, a number of elements is tested. From the results of this test, a scale of 'high', 'good', 'moderate', 'poor' or 'bad' classification is assigned to each element. The description of the classification scale is provided in **Table 10D-1** below.

Table 10D-1. Definition of status in the Water Framework Directive (European Environment Agency, 2022)

Status	Definition
High	Near natural conditions. No restriction on the beneficial used of the waterbody. No impacts on amenity, wildlife or fisheries.
Good	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the waterbody. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Moderate	'moderate' change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the waterbody. No impact on amenity. Some impact on wildlife fisheries.
Poor	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the waterbody. Some impact on amenity. 'moderate' impact on wildlife and fisheries
Bad	Severe change from natural conditions as a result of human activity. Significant restriction on the beneficial uses of the waterbody. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

23. The classification system is based on a worst-case system 'one-out all-out' system, meaning that the overall status is based on the lowest individual parameter score. This general system is summarised below in **Figure 10D-1** below.

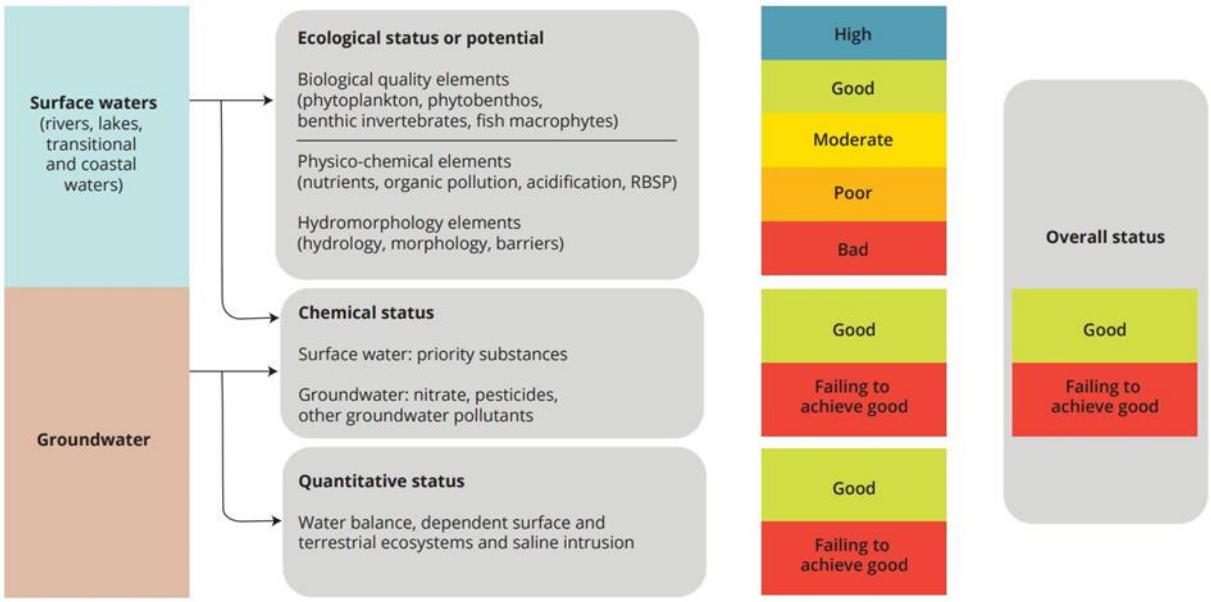

Figure 10D-1 WFD classification elements for surface waterbody status (European Environment Agency, 2018)

24. The overall objective for natural surface waterbodies is to achieve Good Ecological Status and Good Chemical Status. Good Ecological Status represents only a small degree of departure from pristine conditions, which are otherwise known as 'high' Ecological Status.

10.3.6. Ecological status or potential

25. Ecological status is assigned to surface waterbodies that are natural and considered by Natural Resources Wales not to have been significantly modified for anthropogenic purposes.

26. Ecological potential is assigned to artificial and man-made waterbodies (such as canals), or natural waterbodies that have undergone significant modification; these are termed Heavily Modified Waterbodies (HMWBs). The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree, to which the quality of the waterbody approaches the maximum it could achieve, and depends on the classification of WFD parameters and the implementation of mitigation measures identified by the Natural Resources Wales.

27. Ecological status or potential is defined by the overall health or condition of the watercourse. This is defined according to classification of the relevant biological, physico-chemical, and hydromorphological components, defined as follows:

- **Biological**: this test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall waterbody status from 'bad' through to 'high'.
- **Physico-chemical**: this test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physicochemical elements can only influence an overall waterbody status from 'moderate' through to 'high'.
- **Specific pollutants**: this test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic.

As with the physico-chemical test, the specific pollutant assessment can only influence an overall waterbody status from 'moderate' through to 'high'.

- **Hydromorphology**: for natural, non-HMWBs, this test is undertaken when the biological and physico-chemical tests indicate that a waterbody may be of 'high' status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support 'high' status, then the status of the waterbody is limited to Good overall status. For artificial or HMWBs, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physico-chemical elements of a waterbody as less than Good, and hence in determining what mitigation measures may be required to address these failing waterbodies.

10.4 Chemical status

- Chemical status is defined by compliance with environmental standards for chemicals that are priority substances and / or priority hazardous substances, in accordance with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Environmental Permitting (England and Wales) (Amendment) Regulations 2016. Chemical Status is assigned on a scale of 'good' or 'fail'. Surface waterbodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise surface waterbodies are reported as being at good chemical status.

10.5 Assessment methodology

10.5.7. Overview

28. Proposed developments having the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected waterbodies. As part of its role, the Natural Resources Wales must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a waterbody from its current status or potential; and / or
- Prevent future attainment of 'good' status (or potential where not already achieved).

10.5.8. Consultation

29. Consultation with NRW has been undertaken with regards to marine water and sediment quality through the scoping report and opinion and a subsequent consultation meeting on 30 March 2023. Issues raised pertinent to the WFD assessment are outlined in **Table 10D-2.**

Table 10D-2. Summary of the key issues raised by consultees and how each issue was addressed

Consultee	Consultation type and date	Comment raised	How issue has been addressed
NRW	Scoping opinion (July 2022)	NRW requested that Cycle 3 WFD classifications should be used in the assessment.	Data obtained from Water Watch Wales (Cycle 3 WFD Classifications) has been incorporated into this assessment.
NRW	Scoping opinion (July 2022)	NRW requested for any assessment to include	The assessment of effects presented in Chapter 18 of the ES (and summarised

Consultee	Consultation type and date	Comment raised	How issue has been addressed
		the potential for chemical contaminant release with a comparison made against Cefas Action Levels. Dependent on the sediment type present at the landfall location, NRW would require an assessment of the potential to release bacteria from the sediment (noting this is typically associated with fine sediment).	herein) considers the comparison of baseline contaminant levels against Cefas Action Levels. The consideration of the potential to release bacteria from the sediment during the works is also assessed.
NRW	Scoping opinion (July 2022)	NRW requested that should drilling fluids (such as bentonite) be used for installation, this would need to be assessed in the context of suspended sediment releases.	This is considered in the assessment of effects presented within this appendix.
NRW	Scoping opinion (July 2022)	NRW requested that the following aspects were included for assessment in the ES chapter: i) Installation / Decommissioning: Contaminants must be considered all the way up to landfall and must be compared against CEFAS action levels; ii) Installation / Decommissioning: The potential for bacteria mobilisation must be considered; iii) Operation: The potential to increase temperature as a result of cabling must be considered – this could	i) Assessment of contaminant mobilisation is considered across the entire Study Area, and comparison made to CEFAS action levels (**Table**). This is summarised within this WFD assessment. ii) An assessment of the potential for changes in bacteria activity levels is included in this WFD assessment. iii) The potential to increase temperature as a result of cabling is considered from a bacteriology perspective in this assessment. Considerations of temperature increases on marine ecology are also considered. iv) Impacts of trenching for installation of the Offshore Export Cables between the HDD and the Array Area are assessed herein.

Consultee	Consultation type and date	Comment raised	How issue has been addressed
		also impact both benthic ecology and bacterial growth; iv) Installation: While Horizontal Directional Drilling (HDD) has been included (and scoped out) in terms of water contamination, trenching has not. Trenching should be included, and the impacts scoped in due to the potential to release chemicals and / or bacteria; v) It would be helpful to lay out the potential impact pathways for marine water quality more explicitly and within its own section of the ES, so that it can be determined if all correct impact pathways have been identified. For example, it appears that no (or very limited) consideration has been made of the potential for bacterial and turbidity releases to impact on Bathing water quality.	v) Marine water and sediment quality is now set out in a standalone ES chapter while separate WFD assessments have been provided covering the offshore and onshore water environments (below and above MHWS, respectively).
Pre-application consultation			
NRW	Email (25 May 2023)	A request for data was made to NRW on 25 May 2023 to request data on certain water quality parameters within the Study Area and for three WFD water bodies (Milford Haven Inner WFD waterbody (ID: GB531006114100),	This information has been provided and used to inform the WFD baseline conditions (see Section 10.7).

Consultee	Consultation type and date	Comment raised	How issue has been addressed
		Milford Haven Outer WFD waterbody (ID: GB641008220000), and Pembrokeshire South WFD waterbody (ID: GB611008590003)). Data was received from NRW on 30 May 2023	
NRW	Meeting (30-03-23) with regards to marine water quality, sediment quality and WFD	A meeting was held with NRW to outline the project elements as they were at that point in time (March 2023) and to discuss the outcomes of the Scoping Opinion. Topics covered included the ES structure with NRW preferring a separate offshore marine and sediment quality ES chapter. Nature of the landfall at Freshwater West (HDD) and requirement for bacterial assessment was also discussed.	A separate marine water quality and sediment quality ES chapter has been provided as required by NRW and includes bacterial assessment and provides full detail and assessment of the cable installation where it occurs within the marine environment. This has also been considered where relevant within this WFD assessment

10.5.9. Assessment stages

30. A three-stage approach to assessment has been adopted, based on the UK Government's Planning Inspectorate Advice Note Eighteen (PINS, 2017). Although developed for England, this provides a robust and relevant approach to the assessment:

- **Stage 1: WFD Screening** - Identification of the proposed work activities that are to be assessed and determination of which WFD waterbodies could potentially be affected through identification of a Zone of Influence (ZoI). This step also provides a rationale for any waterbodies screened out of the assessment.
- **Stage 2: WFD Scoping** - For each waterbody identified in Stage 1, an assessment is carried out to identify the effects and potential risks to quality elements from all activities. The assessment is made taking into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the proposed works) and good practice mitigation (measures that would occur with or without input from the WFD assessment process).
- **Stage 3: WFD Impact Assessment** – If necessary, depending on the outcomes of Stage 1 and Stage 3, a detailed assessment of the waterbodies and activities carried forward from the WFD screening and scoping stages. This would involve:

- The baseline conditions of the concerned waterbodies;
- An assessment of the risk of deterioration (either in isolation or cumulatively);
- A description of any additional mitigation that is required (if applicable) and how it will be implemented; and,
- An explanation of any positive contributions to the RBMP objectives proposed, and how they will be delivered.

31. This report covers Stages 1-3 of the above assessment process.

10.5.10. Defining No Deterioration

32. A ruling by the Court of Justice of the European Union (CJEU) in July 2015 (Case C-461/13 on the 1 July 2016 (Bund für Umwelt und Naturschutz Deutschland eV v Bundesrepublik Deutschland)) clarified that 'No Deterioration' in WFD terms should be defined as follows:

- 'Deterioration of the status' of the relevant waterbody includes a fall by one class of any element of the 'quality elements', even if the fall does not result in a change in the classification of the waterbody as a whole;
- 'Any deterioration' in quality elements in the lowest class constitutes deterioration; and
- Certainty regarding a project's compliance with the Directive is required at the planning consent stage; hence, where deterioration 'may' be caused, derogations under Regulation 19 of the WFD are required at this stage.

33. Whilst deterioration within a status class does not contravene the requirements of the WFD, (except for Water Supply (Water Quality) (Amendment) Regulations 2018 parameters in drinking water protected areas), the WFD requires that action should be taken to limit within-class deterioration as far as practicable. To manage the risk of deterioration of the biological elements of surface waters, the no deterioration requirements are applied to the environmental standards for the physico-chemical elements, including those for the 'moderate' / 'poor' and 'poor' / 'bad' boundaries.

34. The no deterioration baseline for each waterbody is the status that is reported in **Annex 10D-A Further WFD waterbody information.**

10.5.11. Surface water assessment

35. **Table 10D-3** presents the matrix used to assess the effect of a project on surface water status or potential class. It ranges from a major beneficial effect, a positive change in overall WFD status, through no effect, and down to deterioration in overall status class. The colour coding used in **Table 10D-3** is applied in **Annex 10D-A Further WFD waterbody information.**

Table 10D-3. Surface water assessment matrix

Effect	Description / Criteria	Outcome
Major beneficial	Impacts that taken on their own or in combination with others have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire waterbody	Increase in status of one or more WFD element giving rise to a predicted rise in status class for that waterbody.
Minor / localised beneficial	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the waterbody or any quality elements	Localised improvement, no change in status of WFD element
Green (no impact)	No measurable change to any quality elements.	No change
Yellow - Localised/ temporary adverse effect	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary deterioration that does not affect the overall WFD status of the waterbody or any quality elements or prevent improvement. Consideration will be given to mitigation measures such as habitat creation or enhancement measures.	Localised deterioration, no change in status of WFD element when balanced against mitigation measures embedded in the proposed Project.
Orange - Adverse effect on class of WFD element	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the WFD status class of one or more biological quality elements, but not in the overall status of the waterbody. Consideration will be given to mitigation measures such as habitat creation or enhancement measures.	Decrease in status of WFD element when balanced against positive measures embedded in the proposed Project.
Red – Adverse effect on overall WFD class of waterbody	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the ecological status or potential of a WFD quality element, which then lead to a deterioration of status / potential of waterbody.	Decrease in status of overall WFD waterbody status when balanced against positive measures embedded in the proposed Project.

10.5.12. Future status objectives

36. RBMPs are used to outline waterbody pressures and the actions that are required to address them. The future status objective assessment considers the ecological potential of a surface waterbody and the mitigation measures that defined the ecological potential. Assessments undertaken for the proposed Project are based on mitigation measures defined in the 2022 RBMP. Information on WFD measures available from Water Watch Wales (NRW, 2023) website has also been reviewed. The assessment considers whether a project has the potential to prevent the implementation or impact the effectiveness of the defined measures.

10.5.13. Regulation 19 Derogations

37. Where the potential for "failure is the result of new modifications to the physical characteristics of the body of surface water or alterations to the level of the body of groundwater", it is possible for an applicant to present further assessments in the context of WFD Regulation 19. Regulation 19 is also still commonly referred to as Article 4.7 of the original EU Directive. Derogation has not been considered herein and would require detailed further analyses. For WFD context, WFD Regulation 19 covers part of the procedures for WFD derogation, including but not limited to that:

- "*all practicable steps are taken to mitigate the adverse impact on the status of the body of water*".
- *"the reasons for the modifications or alterations, or for the sustainable development activities, are of overriding public interest"*.
- "*the benefits to the environment and to society of achieving the environmental objectives are outweighed by the benefits of the new modifications or alterations, or of the sustainable development activities, to human health, to the maintenance of human safety, or (in the case of modifications or alterations) to sustainable development*".
- "*the beneficial objectives served by the modifications or alterations, or by the sustainable development activities, cannot, for reasons of technical feasibility or disproportionate cost, be achieved by other means which are a significantly better option*".

38. In addition, the proposed Project must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other EU environmental legislation. In applying Regulation 19, steps must also be taken to make sure that the new provisions guarantee at least the same level of protection as the existing EU legislation.

10.5.14. Environment Agency Clearing the Waters for All guidance

39. Within the PINS Advice Note 18 (PINS, 2017), PINS advise following the approach given in the Environment Agency's Clearing the Waters for All guidance (Environment Agency, 2016) which was developed for estuarine and coastal waters. PINS consider the staged approach equally suitable for rivers, lakes and groundwater projects in England and Wales (despite not being specific to Natural Resources Wales).

40. The Environment Agency's guidance on WFD assessment (Environment Agency, 2016) lists the following activities which can be screened out of assessment due to being of low risk:

- A self-service marine licence activity or an accelerated marine licence activity that meets specific conditions;
- Maintaining pumps at pumping stations – if you do it regularly, avoid low dissolved oxygen levels during maintenance and minimise silt movement when restarting the pumps;
- Removing blockages or obstacles like litter or debris within 10 m of an existing structure to maintain flow;
- Replacing or removing existing pipes, cables or services crossing over a waterbody – but not including any new structure or supports, or new bed or bank reinforcement; and
- 'Over water' replacement or repairs to, for example bridge, pier and jetty surfaces – if you minimise bank or bed disturbance.

- General approach and proposed Project assumptions

41. The following provides a description of the scope of works. The assessment is mainly qualitative and based on readily available data and information, including a site survey. It appraises the potential for non-compliance with the core WFD objectives of no deterioration or failure to improve, taking into account Protected Areas and adjacent waterbodies.

10.5.15. Desk study

42. A desk-based study was carried out to capture information pertaining the proposed Project that is not attainable through site survey. Review of relevant information relating to the Study Area was undertaken to develop a baseline for WFD catchments, watercourses, and surrounding areas. The following data sources were used for the desk study:

- WFD status and objectives from the appropriate River Basin Management Plan for cycle 3 and cycle 2 data, available from Water Watch Wales (NRW, 2023);
- Defra's Multi-agency geographical information for the countryside website (MAGIC), including contemporary Ordnance Survey (OS) maps (DEFRA, 2023);
- British Geological Survey maps (BGS, 2020);
- Aerial photography (Bing, 2023);
- Data provided by NRW upon request, on 30 May 2023 on certain water and sediment quality parameters within the Study Area and for three WFD waterbodies (Milford Haven Inner WFD waterbody (ID: GB531006114100), Milford Haven Outer WFD waterbody (ID: GB641008220000), and Pembrokeshire South WFD waterbody (ID: GB611008590003)). Data was received from NRW.
- Project Erebus ES - The proposed Project Array Area is approximately 4.85 km east of another proposed floating offshore windfarm, Project Erebus, being developed by BlueGem Wind (BGW). This project secured a Marine Licence for this development on the 22 February 2022. Data from the ES has been used to inform this assessment where necessary.

10.5.16. Source-pathway-receptor approach

43. The impact assessment is based on a source-pathway-receptor model. For an impact on the water environment to exist the following is required:

- An impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a waterbody);
- A receptor that is sensitive to that impact (i.e. waterbodies and the services they support); and
- A pathway by which the two are linked.

44. The first stage in applying the Source-Pathway-Receptor model is to identify the causes or 'sources' of potential impact from a development. The sources have been identified through a review of the details of the proposed Project, including the size and nature of the development, potential construction methodologies and timescales. The next step in the model is to undertake a review of the potential receptors, that is, the water environment receptors themselves that have the potential to be affected. The last stage of the model is, therefore, to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor.

45. This has been undertaken in the context of local conditions relative to water receptors within the Study Area, such as topography, geology, climatic conditions, and the nature of the impact (e.g., the mobility of a liquid pollutant or the proximity to works that may physically impact a waterbody).

46. The assessment of the likely significant effects is qualitative, and considers both construction and operation phases, as well as cumulative effects with other developments.

10.6 Assumptions and limitations

47. This WFD is based on baseline and proposed Project design information available at the time of writing in March 2024. It is based on the proposed Project design set out in **Chapter 04: Project Description**.

48. Third party and publicly available information is assumed correct at the time of publication.

49. Surveys have been commissioned for the proposed Project to obtain baseline data for marine sediment quality. However, no surveys were commissioned specifically for the proposed Project for marine water quality. Instead, publicly available data sets from NRW and third parties have been used. The publicly available data for marine water quality is not obtained from the Offshore Development Area, but from other areas nearby (see **Volume 5: Figure 18-3 of the ES**). There will be a degree of similarity between both areas in terms of water quality, but it should be noted that there are likely to be slight variations between results used to inform the assessment and actual on-site conditions. This has been considered within the assessment. Any water quality sampling also only reflects the conditions at the time of the sampling, and thus provides an indication of quality only.

50. In addition to the baseline data obtained for marine sediment quality (obtained from the surveys commissioned for the proposed Project), marine sediment data has also been provided by NRW. Both datasets have been used to provide a wider understanding of sediments within the Study Area and adjacent waters. Out of the data provided by NRW, only one sampling station (S90090) reports on sediment quality. The other stations report only on grain size of the sediment. The data from sampling station S90090 will not be representative of the whole Study Area. However, additional data supplements this (particularly the sediment sampling campaign undertaken for the proposed Project).

51. The NRW sediment data covers only a small portion of the coastline adjacent to the Study Area (see **Volume 5: Figure 18-4**). None of the data points provided by NRW are taken within the Study Area itself and so a degree of variation is expected between the results used and those that exist onsite. However, due to the areas within the Offshore Development Area being more exposed than the estuarine and coastal areas in which NRW data is provided from, it is anticipated that the concentrations of determinands in the Study Area are likely to be lower than those identified at the NRW testing sites. This is due to the distance to coastal, shoreline and land based activities, the greater exposure from wind, waves and tidal movements within the Study Area which will likely disperse any determinands throughout the water column.

52. To supplement data from NRW and the surveys commissioned for the proposed Project, information from the nearby Erebus project ES has been used (Marine Space, 2019). The Erebus project partially follows the same OfECC as the proposed Project, and its array area is also situated adjacent to the Array Area for the proposed Project. It should be noted that the raw data used to inform the Erebus assessment was not published. As a result, reliance on the interpretations made in the relevant ES chapters has been made instead. It is assumed for the purposes of this WFD assessment that these interpretations are accurate.

53. Sediment sampling was undertaken for the proposed Project. The results from this are presented in **Appendix 18C** (Benthic Characterisation Survey Report (Ocean Ecology, 2023)). A total of 30 sediment samples were taken across the Offshore Development Area. However, since these samples were taken the Offshore Development Area has been refined. Some of these samples are therefore outside of the Array Area but are still contained within the Study Area (see **Volume 5: Figure 18-4**). However, due to their close proximity to the offshore proposed Project development area, this is considered to remain representative of the wider baseline conditions.

10.7 Baseline Information

54. The relevant baseline physical characteristics of the Study Area and the WFD water features present are described in this section.

10.7.17. Geology and soils

55. The bedrock geology in the vicinity of the proposed Array Area comprises chalk, and mudstone and sandstone. With the latter being the main rock-type from offshore into the Milford Haven Waterway.

56. In terms of seabed sediments, these are predominantly muddy sandy gravel whilst inshore, around the south Pembrokeshire coast, is characterised by rocky reefs, shoals and sandbanks. Towards the Milford Haven Waterway, seabed sediments are characterized by gravelly sand.

57. Further details of geology and seabed sediments are described in **Chapter 17: Physical Environment**.

10.7.18. Surface water bodies

58. The Study Area is located within coastal and transitional water features, located within the Western Wales RBD.

59. There are three WFD designated waterbodies within the Study Area, of which two are coastal (Pembrokeshire South & Milford Haven Outer) and one is transitional (Milford Haven Inner). These waterbodies are located within the Cleddau and Pembrokeshire Coastal Rivers (TraC) Management Catchment. The WFD waterbodies are shown in **Figure 10D-2** below.

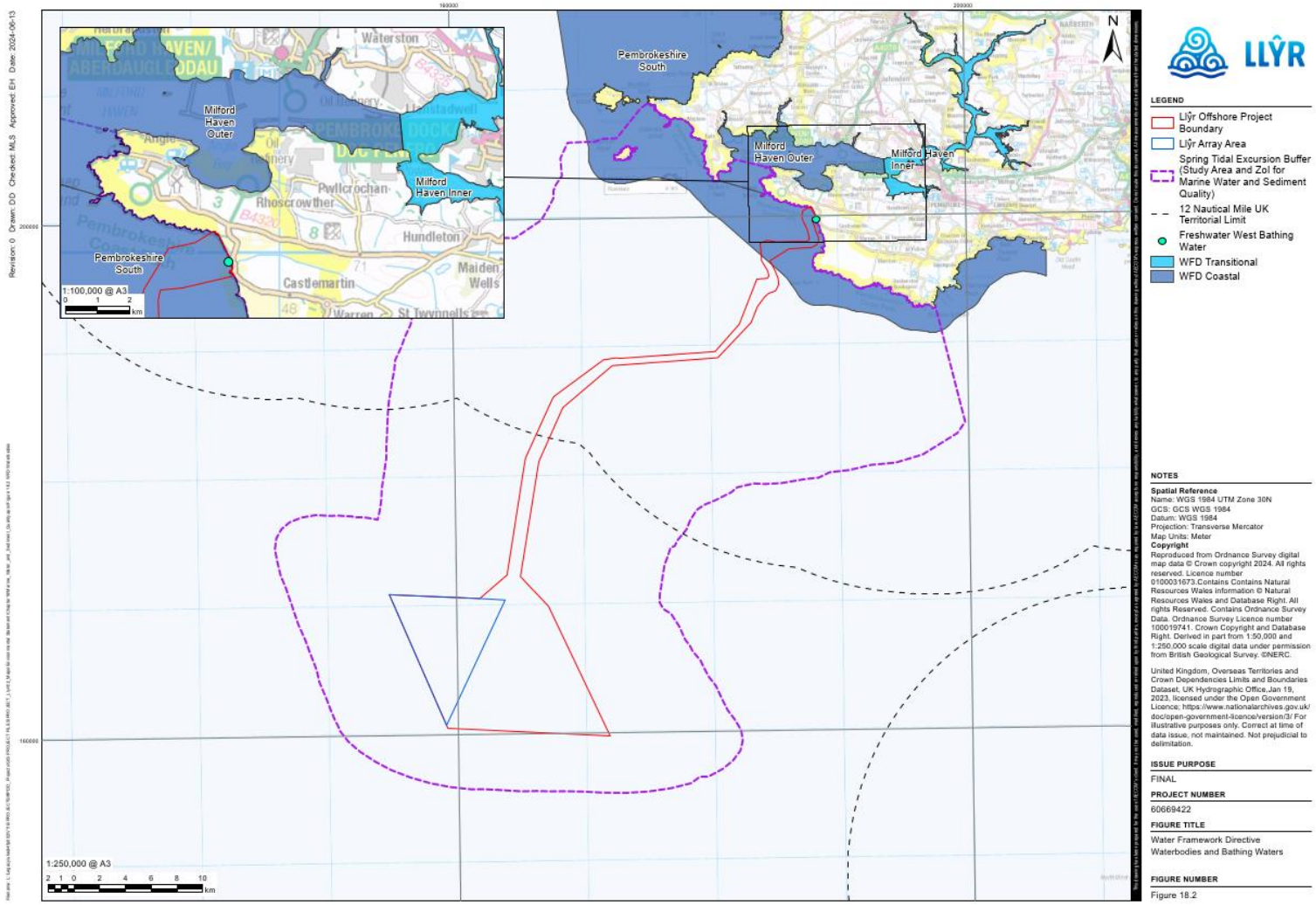

Figure 10D-2 WFD water bodies identified within the Study Area

60. None of these waterbodies have been designated as HMWB. No groundwater or river waterbodies are present within the Study Area.

61. Using data from Water Watch Wales (NRW, 2023) website, a summary list of the WFD designated waterbodies present within the Study Area has been compiled. This is shown in **Table 10D-4** below. Further WFD waterbody information is also compiled in **Annex 10D-A Further WFD waterbody information**.

Table 10D-4. WFD waterbodies present within the Study Area

Waterbody ID	Type of waterbody	Operational Catchment	Current Status	Target Status
Pembrokeshire South (GB611008590003)	Coastal	Pembrokeshire South	Overall: Good Ecological: Good Chemical: High	Good (2027)
Milford Haven Outer (GB641008220000)	Coastal	Milford Haven	Overall: Moderate Ecological: Moderate Chemical: Moderate	Good (2033)
Milford Haven Inner (GB531006114100)	Transitional	Milford Haven	Overall: Moderate Ecological: Moderate Chemical: Moderate	Good (2027)

10.7.19. Marine water quality

62. Whilst Pembrokeshire South WFD is classified as good under WFD Cycle 3 (2021), Milford Haven Inner and Outer are classified as 'moderate', both with chemical status classified as 'fail'.

Erebus project information

63. A sampling exercise was undertaken for Project Erebus. Water quality samples were collected from 26 sampling stations across the portion of the export cable corridor that intersects WFD water bodies (Marine Space, 2019). Stations were positioned along the centre of the proposed cable route at approximately 500 m intervals with three samples collected per station (at 2 m above the bed, mid-water depth, and 2 m below the water surface). These were analysed to assess concentrations of chlorophyll, total suspended solids, dissolved oxygen, nutrients, hydrocarbons and metals.

64. In all but one case, chlorophyll concentrations were below the limits of detection. Total suspended solid concentrations were low to moderate (range <5 mg/l - 23 mg/l). Note that the WFD (Standards and Classifications) (England and Wales) Directions 2015 classify total suspended sediment concentrations <10 mg/l as clear and 10-100 mg/l as intermediate in terms of their clarity. All total suspended solid samples could therefore be considered 'clear to intermediate'.

65. All dissolved oxygen samples were above the standard corresponding to 'high' under the WFD environmental quality standards (EQS) (i.e. the 5th percentile value for dissolved oxygen concentrations in mg/l were above 5.7).

66. Maximum concentrations of nutrients recorded in the Project Erebus sampling were 0.55 mg/l ammoniacal nitrogen, 0.4 mg/l nitrate, <0.01 mg/l nitrite and 0.13 mg/l phosphate. The ammoniacal nitrogen value corresponds to a classification of 'high' (<1.4 mg/l) for both clear and intermediate turbidity transitional or coastal waters in the WFD EQS (i.e. the WFD

(Standards and Classifications) (England and Wales) Directions 2015). There are no specific EQS for nitrate, nitrite and phosphate.

67. Heavy and trace metal concentrations were consistently low and below the limit of detection in most cases. However, zinc levels were found to exceed the WFD EQS (long term mean 6.8 µg/l) within 3 of 78 samples and cadmium was found to exceed WFD EQS (long term mean 0. 02 µg/l) in one sample. All Polycyclic Aromatic Hydrocarbons (PAHs) were found to be below the laboratory limits of detection.

68. The sampling exercise for Project Erebus indicates that baseline marine water quality across the proposed Project Study Area (where it coincides with Erebus' study area) is generally good with low levels of chemical contamination. This was consistent with other nearby projects including the Greenlink Interconnector and Atlantic Array, which report that dissolved contaminants off the Pembrokeshire coast and in the Celtic Sea are low or below limits of detection for current analytical tools (RWE, 2013) (Intertek, 2019).

Data provided by NRW

69. In order to support the interpretation of the Erebus project water quality data outlined above, a data request was made to NRW on 25 May 2023. A shapefile for the Study Area was provided to NRW and the request for water quality data relating to that area.

70. The parameters relating to water quality that were requested from NRW for all three water bodies and the Study Area included the following:

- Chlorophyll;
- Dissolved Organic Carbonas C (DOC);
- Phytoplankton;
- Salinity (in situ);
- Total suspended solids / particulate matter;
- Dissolved oxygen;
- Nutrients (including nitrate, nitrite, orthophosphate, silicate, nitrogen, and ammoniacal nitrogen).
- PAHs (including Naphthalene Acenaphthylene Acenaphthene Fluorene Phenanthrene Dibenzothiophene Anthracene Fluoranthene Pyrene Benzo[a]anthracene Chrysene Benzo[a]pyrene Indeno[123,cd]pyrene Dibenzo[a,h]anthracene Benzo[ghi]perylene); and
- Heavy and trace metals (including: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn)).

71. It should be noted that the data provided by NRW does not cover the exact area of the proposed Project and relates to existing monitoring of the near shore and estuarine areas associated with the three WFD water bodies (see **Volume 5: Figure 18-3**). These monitoring points are therefore more likely to be affected by interactions with the shoreline and runoff from the land.

72. Raw data provided by NRW has been summarised and is available as **Appendix 18A**. The data shows that the existing water quality within the Study Area exceeds the WFD saline guidance for levels of copper. As displayed in **Volume 5: Figure 18-3**, the locations where water quality samples are taken from are near to the shoreline. Therefore, the levels of chemicals detected are likely to be representative of water quality in areas of the proposed Project that are closer to the coast. However, for areas further offshore such as the Array Area, it is considered likely

that chemical concentrations will be largely reduced, due to tidal and wave action dispersing these throughout the water column. Therefore, due its closer proximity to the Offshore Development Area and specifically the OfECC, it is considered that the Erebus data is likely to be more representative.

Marine sediment quality baseline

73. The physical properties of different sediment types are typically associated with varying levels of contaminants that might be contained within them. Fine muddy sediments have an increased risk due to their relatively large surface area and greater cation exchange capacity (the soil's ability to hold positively charged ions) compared to coarser sediments.

74. Project specific sediment sampling data is available (see **Appendix 18C**, (Ocean Ecology, 2023)) from a total of 30 grab samples taken from the proposed Project site. Not all the sampling station are now within the proposed array area, but due to the close proximity, this provides a suitable baseline for the assessment. It was found that:

- **Total Organic Carbon (TOC):** In general, the highest TOC and Total Organic Matter (TOM) content in the sediment was found at stations with the highest mud content (> 20%).
- **Heavy and trace metals**: Eight heavy metals were identified from the sampling stations. These included; arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickle (Ni), and zinc (Zn). None of the main heavy and trace metals exceeded reference levels, with the exception of As, which was identified above CEFAS Action Level 1 (AL 1) at four stations (ENV001, ENV007, ENV013, and ENV014) in the east of the array area. No determinands were identified to be above Cefas AL 2. The most abundant metal found was Zn, but was always present below reference levels.
- **PAHs**: The only reference level exceeded for PAHs was the Tetraethyl lead (TEL), with Napthalene exceeding the TEL reference level at station ENV001.
- **THC**: N-alkanes (saturates) in sediments had carbon chain lengths ranging between C12 and C36, with the dominant chains being C28 for the even numbered chains, and C29 for the odd numbered chains. The highest concentration of total n-alkanes was recorded at station ENV001, being 94.4 µg kg^{-1}.
- **PCBs and Organotins**: Both PCBs and Organotins were below the detection limit at all stations.

75. Raw data provided by NRW has also been summarised and is available in **Appendix 18B**. From the data provided from NRW, only one sampling station (S90090) reports on sediment quality. The sediment at this location (within the Milford Haven Waterway), exceeds Cefas Action Level 1 for a number of determinands. Cefas Action Level 2, however, is only exceeded for levels of cadmium (with the same being the case for Canadian Sediment Quality Guidelines). This sampling point is located much further up the estuary than where works are proposed to take place, and it is considered likely that raised determinand levels are due to historical industry in this area. Within the Offshore Development Area there is likely to be reduced historical contamination in the sediments, given the distance from the shore, the spatial extent of the site, and with sediment experiencing a high disturbance level due to ongoing tidal and wave action. Therefore, determinand levels within the Offshore Development Area are considered to be lower than those experienced at sampling station S90090.

76. A full description of marine water and sediment quality data is provided in **Chapter 18: Marine Water and Sediment Quality.**

10.7.20. Benthic habitat and ecology overview

77. An overview of the benthic habitat and ecology within the Study Area is provided in this section. A full description of marine freshwater ecology is provided in **Chapter 19: Benthic Ecology**.

78. There is a wide range of habitats supported within the waters of the Study Area. Particle size is shown to increase along the Offshore Project Boundary from the Array Area to the landfall, with sediment getting coarser. Overall, the Study Area is dominated by sand, gravels and muds, with each proportion varying between different zones. A summary of the benthic area identified is provided in **Table 10D-5** below.

Table 10D-5. Description of benthic habitat within the Study Area

Area	Benthic habitat	Ecology
Array Area	Sandy substrate, consisting of varying compositions of circalittoral, fine sand mixed with gravel and mud. Within this mix, gravel was more abundant than mud, with the majority of the Array Area identified as slightly gravelly sand.	Habitats such as sand and gravel are characterised by species including bivalves and echinoderms.
Offshore	Sandy habitats, including Turbot Bank sandbank, located in the northern sections. The most dominant classification of sediment identified was gravelly sand and slightly gravelly sand. Such habitats host several communities including polychaetes, echinoderms and bivalve molluscs. In addition, small areas of bedrock and stony reef were also identified with a mix of faunal turf communities and aggregations of ross worm (*Sabellaria spinulosa)* present.	Communities which form in stony reefs include assemblages of coral, sponges, fish, crustaceans and ascidians. Mobile fauna are often in high abundance in this habitat, including echinoderms and squat lobsters. Bedrock reefs are diverse habitats with variations in topography and complexity, resulting in several different communities and species present including corals, sponges and ascidians which represent key prey items for further species including fish and crustaceans. Habitats such as Turbot Bank typically consist of burrowing fauna including polychaetes, echinoderms, crustaceans and bivalve molluscs, as well as shrimps, crabs and fish including sandeels (*Ammodytes* sp.). Due to the presence of several key prey items, these areas often form key foraging habitat for seabirds. However, video imagery used to sample the area of Turbot Bank intersected by the Offshore Project Boundary identified large quantities of mussel shells, other shell fragments, hermit crab (Paguridae spp.) and spiny starfish (*Marthasterias glacialis*).
Subtidal	Benthos predominantly characterised by sandy habitat. The sandy habitat transitions into large patches of high energy circalittoral rock	Habitats such as sand and gravel are characterised by species including bivalves and echinoderms.

Area	Benthic habitat	Ecology
	typically dominated by sponges including the breadcrumb sponge (*Halichondria panicea*), dense carpets of oaten pipes hydroid (*Tubularia indivisa*), high numbers of acorn barnacles (*Balanus crenatus*) and soft coral species such as dead man's fingers (*Alcyonium digitatum*)	
Intertidal	Clean, fine, littoral sandy habitat with typical intertidal species including polychaetes and isopods (NRW, 2022). Freshwater West is bordered by rocky shore with areas of shingle and mud. The rocky shore consists of low to high energy littoral rock with fucoid (e.g., *Fucus serratus*) and red seaweed species and communities of intertidal species such as mussels and barnacles. Freshwater West is protected by the Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation (SAC) which is designated for several habitats including mudflats and sandflats which are an Annex I habitat. There are also several 'submerged or partially submerged sea caves' in the Study Area, including on the intertidal rocky coastlines of Angle Peninsula, Skomer Island south of Freshwater West (NRW, 2023). These habitats are frequently subject to strong wave action and water surges, which results in scouring of the cave walls from the highly mobile material on the cave floors which consists of coarse sediment, boulders and cobbles.	The benthic characterisation survey did not cover sea caves. However, such habitats are typically characterised by encrusting species including barnacles (*Balanus crenatus*), mussels, encrusting bryozoans, cushion sponges and colonial ascidians (JNCC, 2023). Further species identified in sea caves in the Study Area (NRW, 2023) include colonial bryozoan *Flustrellida hispida,* spirorbid worms, *Dendrodoa* spp., soft coral *Parerythropodium coralloides,* colonial cup coral *Hoplangia durotrix*, the Devonshire cup coral *Caryophyllia smithii* and the feather bryozoan *Bugula plumosa*.

79. Benthic conditions, including the sediment type present in the Study Area, is an important determinant of the presence of spawning grounds and suitable habitat for herring (*Clupea harengus*) and sandeel (*Ammodytidae* spp) in particular. Protected Habitats and Species and other Habitats of Principle Importance (HOPI) listed under Section 7 of the Environment Wales Act (2016) were identified within the Study Area. A summary of these is provided in **Table** below.

Table 10D-6. Protected Habitats and Species and HOPI within the Study Area

Protected Habitats and Species	Other habitats present
• Stony reef and bedrock reef • Biogenic reef • Sandbank • Sublittoral sands and gravel	• Blue mussel beds • Non-coralline crustose red alga (*Cruoria cruoriiformis*) • Estuarine rock • Pink sea fan (*Eucinella verrucosa*) • Fragile sponge and anthozoans • Stalked jellyfish (*Haliclystus auricula*) • Intertidal mudflats* • Intertidal underboulder • Coral maerl (*Lithothamnion coralloides*) • Stalked jellyfish (*Lucernariopsis campanulate*) • Maerl beds live* • Maerl beds live and dead* • Mud habitats in deep water • Green ornicat beds (*Musculus discors*) • Peat clay exposures • Saltmarsh* • Seagrass beds* • Sheltered muddy gravel • Tide swept channels

*Habitats which are also listed under OSPAR (OSPAR Convention, 2023)

80. In terms of macrofauna, in the nearshore sections of the proposed Project, the majority of biomass was identified as consisting of species of Mollusca. Species regularly observed in nearshore waters included *Cellaria* spp., acorn barnacles (*Semibalanus balanoides*), cup corals (*Caryophillia smithii*), branching sponges (*Stelligera montagui*) and cushion sponges (*Dysidea fragilis*).

81. Echinodermata were the overall dominant taxa across the Study Area, with juvenile brittle star species identified as the most abundant. However, the two-toothed Montagu shell (*Kurtiella bidentata*) had the highest maximum abundance per sample. Total abundance of species was higher in the Array Area, however more stations are present here and therefore sampling effort was higher.

82. The following distinct communities of macrobenthic species were identified within the Study Area:

- Community characterised by *Amphiuridae,* the two-toothed Montagu shell and the armoured bristle worm (*Scoloplos armiger*), was identified in the southern sections of the Offshore Project Boundary and in much of the Array Area. This was the most dominant microbenthic group.
- Community of macrobenthic species characterised by *Amphiuridae*, the two-toothed Montagu shell and the brittle star (*Amphiura filiformis*). This community was mostly

identified in the middle of the Offshore Project Boundary route and in the southern sections of the Array Area.

- Community characterised by the bivalve triangular starte (*Goodallia triangularis*) and *Spisula spp.*, and the pea urchin (*Echinocyamus pusillus*) was identified in the northern section of the Offshore Project Boundary in shallower water.

83. In addition to these communities, a total of 169 *S. spinulosa* individuals were identified in the Study Area. *S. spinulosa* is a recognised as a threatened and / or declining species under the OSPAR convention (OSPAR, 2008).

84. There were no oyster beds identified in the Study Area during the benthic survey. There were also no fish, such as sandeel, caught during the benthic survey. However, several shellfish species were identified scattered across the Study Area and within the cable route using imagery analysis, including crabs (*Ebalia* spp.), rugose squat lobster (*Munida rugosa*), the common hermit crab (*Pagurus bernhardus*) and caridean shrimp (*Caridea* spp.). Blue mussel beds (*Mytilus edulis*) were also identified on biogenic reef in nearshore waters on approach to the landfall at Freshwater West.

85. In addition, notable taxa found in surveys conducted for the Project Erebus Environmental Statement include the Atlantic mud shrimp (*Solenocera membranacea)* which is unusual in UK waters, and the thumbnail crab (*Thia scutellata)* which is a nationally scarce species (Marine Space Ltd, 2019a).

86. There were no INNS identified across the Study Area in both nearshore and offshore waters during the benthic characterisation study. Nonetheless, an assessment of INNS during the Project Erebus Environmental Statement found several INNS to be present, including the American slipper limpet (*Crepidula fornicata)* in Milford Haven waterway, the modest barnacle (*Austrominiius modestus)*, the polychaete (*Goniadella gracilis)* and the leathery sea squirt (*Styela clava)* (Marine Space Ltd, 2019b)

87. The key sites designated for the protection of benthic features within the Study Area consist of two SAC, two SSSI and one Marine Conservation Zone (MCZ). These are:

- Pembrokeshire Marine / Sir Benfro Forol SAC
- Limestone Coast of South West Wales / Arfordir Calchfaen de Orllewin Cymru SAC
- Milford Haven Waterway SSSI
- Angle Peninsula Coast / Arfordir Penrhyn Angle SSSI
- Skomer MCZ

10.7.21. Fish and shellfish ecology overview

88. A full description of fish and shellfish ecology is provided in **Chapter 20: Fish and Shellfish Ecology** with a summary provided in **Table 10D-7.**

Table 10D-7. Protected Habitats and Species and HOPI within the Study Area

Functional Fish group	Baseline
Pelagic	Species within the Study Area from 2016-2020 (MMO, 2021) were: • Mackerel (*Scomber scombrus*); • horse mackerel (*Trachurus trachurus*);

Functional Fish group	Baseline
	• herring; • blue whiting (*Micromesistius poutassou*); • indo-pacific sailfish (*Istiophorus platypterus*); and • pilchards (*Sardina pilchardus*) were all < 1 tonne (MMO, 2021). Of these species, only herring exhibit a demersal life history stage and therefore could be directly impacted by the proposed Project; the remainder are entirely pelagic throughout their life cycle.
Demersal	• Benthic habitat mapping indicates that suitable habitat for sandeel may be present. The proposed Project falls within a large swath of deep circalittoral sand, transitioning to 'deep circalittoral coarse sediment' (EUNIS A5.15) and 'circalittoral coarse sediment', which may be suitable for sandeel. • The Study Area has been identified as important nursery grounds for anglerfish (*Lophius piscatorius*), hake (*Merluccius merluccius*), lemon sole (*Microstomus kitt*), plaice (*Pleuronectes platessa*), sole (*Solea solea*), and whiting (*Merlangius merlangus*)
Diadromous (Migratory Fish)	• It appears that the majority of Atlantic salmon (*Salmo salar*) individuals remain nearby in tidal water of their home estuary and the wider Bristol Channel (Swain, 1982). • No sea trout (*Salmo trutta*) were recorded in in the TraC surveys between 2000-2019 in the Bristol Channel, though trout has been reported in rivers near the proposed Project (Eastern and Western, River Tywi and River Taf) • Less than 20 individuals were recorded in the TraC surveys between 2000-2019 in the Bristol Channel. Assessments of conservation objectives within the above SACs indicated that sea lamprey (*Petromyzon marinus*) are of an unfavourable status in the Pembrokeshire Marine SAC. • Not much is known about shad (*Alosa alosa*) in the Pembrokeshire Marine SAC, but data indicate that important habitats for shad are extensive (NRW,2018d). • There are many records of European eel (*Anguilla anguilla*) in Pembrokeshire, therefore it can be considered that the species may overlap with the Study Area
Elasmobranchs	• Wales has been identified as an important area for angelshark (*Squatina squatina*) in UK waters. With over 1,600 angelshark having been observed around the Bristol Channel and Cardigan Bay since 1942 (Barker et al., 2020) and the potential for suitable habitat, it is likely that angelshark will occur within the Study Area. • It is likely that basking shark will occur near the proposed Project, especially during summer months. This is supported by site specific surveys which observed 13 individuals within the Study Area. • There is potential for other species to be present in the Study Area among which are spurdog (*Squalus acanthias*) and tope (*Galeorhinus galeus*), which are species of principal importance in Wales.
Shellfish	• The Study Area falls within important spawning and nursery ground for Norway lobster (*Nephrops norvegicus*). • European lobster (*Homarus gammurus*), is generally found from the intertidal zone to depths of 60 m and therefore has the potential to be found in coarse habitats within the Study Area. • Crab Fishery Units have been defined for brown (edible) crab (*Cancer pagurus*), with the Study Area falling within the 'Celtic Sea'.

Functional Fish group	Baseline
	• Spider crabs (*Maja squinado*) were found to be present at several locations in the benthic characterisation study, identified from image analysis. • The common whelk (*Buccinum undatum*) are subject to a significant fishery in the Study Area • A stock of king scallops (*Pecten maximus*) was identified in the Bristol Channel for assessment in 2018.
Spawning and nursery grounds	Although there appears to be a small area of suitable sediment, the area in which the proposed Project site falls is not considered to represent important herring spawning habitat. Areas of preferred habitat for sandeel were identified throughout the Array Area, including the Offshore Project Boundary. Within the Study Area, low-intensity nursery grounds were identified for sandeel, sole, plaice, mackerel, horse mackerel, anglerfish, herring, hake, and whiting. The Study Area hosts nursery grounds for herring, sprat, sardine, anchovy, sandeel, horse mackerel, mackerel, whiting, and cod (Campanella and van der Kooij, 2021).

Protected Species

89. There are several fish species known to be present in the Study Area which are protected under national and international conservation legislation (see **Table 10D-8**). The basking shark and angleshark are also protected under the Wildlife and Countryside Act 1981.

Table 10D-8. Summary of relevant fish and shellfish species protected by national and international legislation or policy

Common names	Latin names	Wildlife and Countryside Act Schedule 5	Habitats Directive Annex II and IV species	OSPAR list of threatened and/or	NERC 2006 Species of Principal Importance / Section 7 of the Environment Act	Features of Conservation Interest (FOCI)
Allis shad	*Alosa alosa*	✓	✓	✓	✓	
Atlantic salmon	*Salmo salar*		✓	✓	✓	
Angelshark	*Squatina squatina*	✓		✓	✓	
Basking shark	*Cetorhinus maximus*	✓		✓	✓	
Bluefin tuna	*Thunnus thynnus*			✓		
Dover sole	*Solea solea*				✓	
European eel	*Anguilla anguilla*			✓	✓	✓
Herring	*Clupea harengus*				✓	

Common names	Latin names	Wildlife and Countryside Act Schedule 5	Habitats Directive Annex II and IV species	OSPAR list of threatened and/or	NERC 2006 Species of Principal Importance / Section 7 of the Environment Act	Features of Conservation Interest (FOCI)
Mackerel	*Scomber scombrus*				✓	
Plaice	*Pleuronectes platessa*				✓	
Sandeel	*Ammodytidae*					
River lamprey	*Lampetra fluviatilis*		✓		✓	
Sea lamprey	*Petromyzon marinus*		✓	✓	✓	
Sprat	*Sprattus sprattus*					
Twaite shad	*Alosa fallax*	✓	✓		✓	
Whiting	*Merlangius merlangus*				✓	
Native oyster	*Ostrea edulis*			✓	✓	✓

Designated sites

90. A full description of Sites of Ecological Importance is provided in **Chapter 20: Fish and Shellfish Ecology**.

91. The Study Area overlaps with a number of designated sites, which form part of the UK's national site network of Special Areas of Conservation (SAC), Special Protected Areas (SPA), and Marine Conservation Zones (MCZ). Several sites occur within the Study Area which are designated for the protection of fish and shellfish. These are described in **Table 10D-9** below and presented in **Figure 20-1** in **Chapter 20 Fish and Shellfish Ecology**.

Table 10D-9 Designated sites within the Study Area and their protected species

Designated Site	Distance to OfECC	Distance to Array Area	Protected Species
Sir Benfro Forol / Pembrokeshire Marine SAC	0.0 km	23.04 km	Allis shad, River lamprey, Sea lamprey, Twaite shad
Bae Caerfyrddin ac Aberoedd / Carmarthen Bay and Estuaries SAC	24.63 km	53.94	Allis shad, River lamprey, Sea lamprey, Twaite shad
Afonydd Cleddau / Cleddau River SAC	16.52 km	55.03	River lamprey, Sea lamprey
Bae Ceredigion / Cardigan Bay SAC	50.18 km	88.42	River lamprey, Sea lamprey

Designated Site	Distance to OfECC	Distance to Array Area	Protected Species
Afon Teifi / River Teifi SAC	51.22 km	89.87	Atlantic salmon, River lamprey, Sea lamprey
Afon Tywi / River Tywi SAC	55.07 km	90.19	Allis shad, River lamprey, Sea lamprey, Twaite shad
River Usk / Afon Wysg SAC	98.15 km	131.13	Sea lamprey, River lamprey, Twaite shad, Atlantic salmon
River Wye / Afon Gwy SAC	141.17 km	174.8	Sea lamprey, River lamprey, Twaite shad, Atlantic salmon
Mor Hafren / Severn Estuary SAC	132.98 km	154.78	River lamprey, Sea lamprey, Twaite shad

92. Several Sites of Special Scientific Interest (SSSIs) are also present in the Study Area which provide protection to shellfish including oyster and mussels (**Table 10D-10**).

Table 10D-10. SSSIs in the Study Area protecting shellfish species

Designated Site	Distance to Offshore ECC	Distance to Array Area	Protected Species
Milford Haven Waterway SSSI	1.32 km	39.66 km	Native oyster
Skomer Island and Middleholm SSSI	10.3 km	38.94 km	Blue mussel
Skokholm SSSI	8.15 km	35.27 km	Blue mussel

10.7.22. WFD protected areas

93. There are a number of WFD protected areas located within 2km of the tidal excursion limit. These are shown in **Figure 10D-3** and outlined in **Table 10D-11** below. The WFD protected areas, within 2 km of the tidal excursion limit, considered for the assessment of effects are shown as follows:

- Marine Special Areas of Conservation (SACs);
- Marine Special Protection Areas (SPAs)
- Shellfish waters;
- Bathing waters; and
- Nutrient sensitive areas.

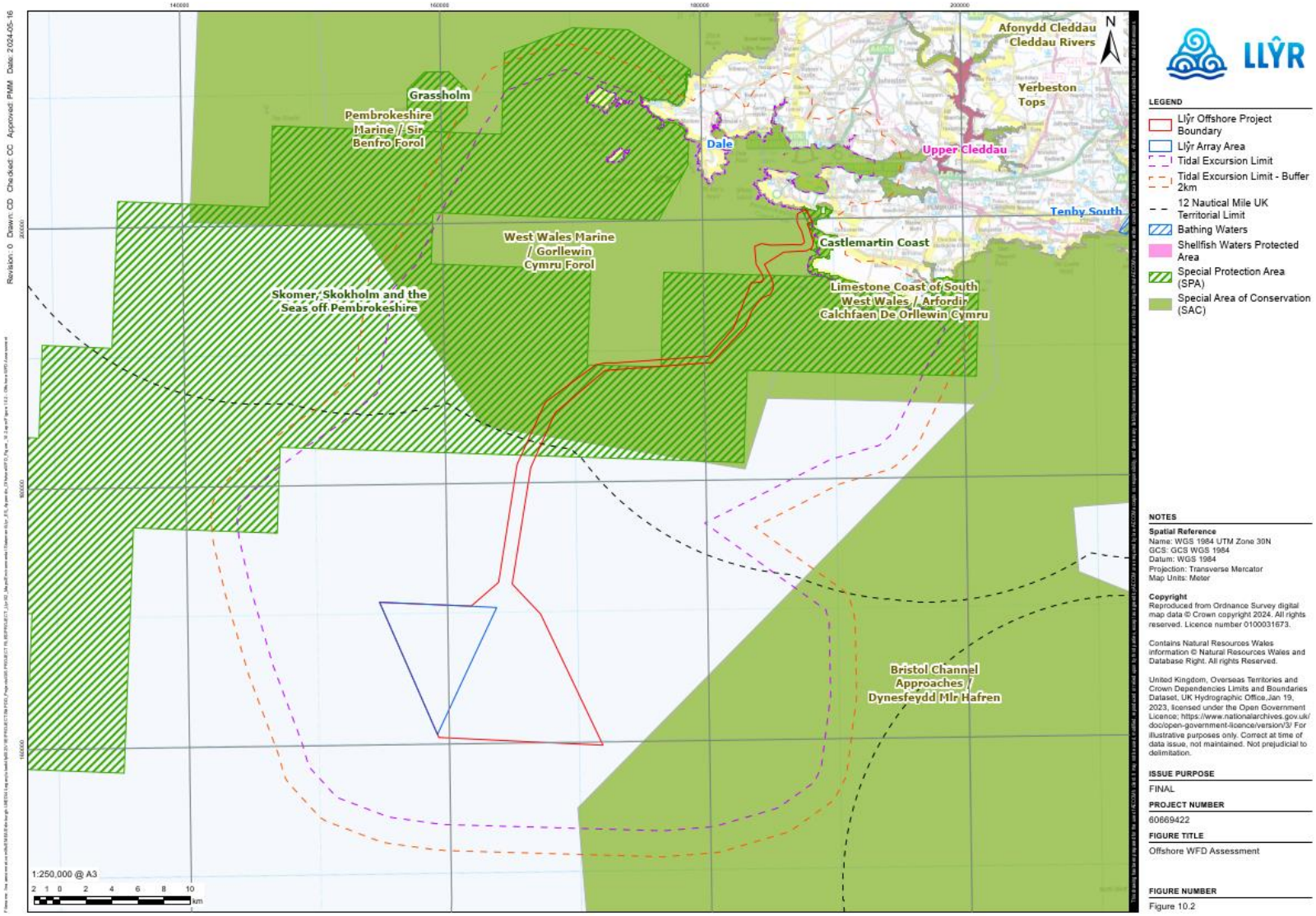

Figure 10D-3 WFD protected area within 2km of the tidal excursion

Table 10D-11. WFD protected area within 2 km of the tidal excursion

Designated site	Description
Special Areas of Conservation (SAC)	
Pembrokeshore Marine SAC / Sir Benfro Forol	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. / Calcium-rich nutrientpoor lakes, lochs and pools. Greater horseshoe bat (*Rhinolophus ferrumequinum*). Lesser Horseshoe Bat (*Rhinolophus hipposideros*). Otter (*Lutra lutra*).
West Wales Marine SAC / Gorllewin Cymru Forol	Harbour porpoise (*Phocoena phocoena*)
Special Protection Areas (SPA)	
Castlemartin Coast SPA	Chough (*Pyrrhocorax pyrrhocorax*)
Skomer, Skokholm and the Seas of Pembrokeshire SPA / Sgomer, Sgogwm a Moroedd Penfro	European storm petrel (*Hydrobates pelagicus*), Red-billed chough (*Pyrrhocorax pyrrhocorax*), Short-eared owl (*Asio flammeus*), Manx shearwater (*Puffinus puffinus*), Altantic puffin (*Fratercula arctica*), Lesser black-backed gull (*Larus fuscus*), seabird assemblage.
Grassholm SPA	Gannet (*Morus bassanus*)
Shellfish waters	
None identified within 2km of tidal excursion area	-
Bathing waters	
Dale	The water quality of this Bathing Water is excellent (2021). This bathing water does not have a history of large amounts of seaweed (macroalgae). Phytoplankton (microscopic algae) naturally increase in number at certain times of the year. This Bathing Water has a history of phytoplankton blooms.

10.7.23. Water resources

94. There are no Drinking Water Protected Areas within the Study Area. Water abstractions and pollutions incidents within the Study Area are summarised within the sections below.

95. In terms of water pollution incidents, one pollution incident was recorded within the Study Area at NGR SM9515603354. This was a gas and fuel oils pollution incident recorded in 2018 impacting into water principally, but also land.

96. There are two effective abstractions within the Study Area operated by private energy companies. A summary with details of these abstractions is provided **Table 10D-12** below:

Table 10D-12. Summary of water abstractions within the Study Area

Permit Number	Regime	Operator	Type	NGR
WA/061/0005/013	Full Abstraction	Puma Energy (UK) Limited	Surface Water	SM 88610 04617
WA/061/0006/002	Full Abstraction	Valero Energy Ltd	Surface Water	SM 89220 04060

10.8 Future baseline

97. This section considers the changes to the baseline conditions described above that might occur during the time period over which the proposed Project will be in place. It considers changes that might occur in the absence of the proposed Project being installed.

10.8.24. Marine Water quality

98. All WFD waterbodies identified within the Study Area (Milford Haven Inner, Milford Haven Outer and Pembrokeshire) have a target of Good (Good by 2027 for Milford Haven Inner and Pembrokeshire, and Good by 2033 for Milford Haven outer (based on Cycle 3 information for RBMP) [1].

99. It is likely that through the action of new legislative requirements and ever more stringent planning policy and regulation, that the health of the water environment will continue to improve post-2027. The Environment (Wales) Act 2016 and the proposed Levelling-Up and Regeneration Bill include measures to tackle storm sewage discharges and set new requirements on phosphate removal from sewage treatment works. There are, however, significant challenges such as adapting to a changing climate and pressures of population growth that could lessen these changes. It is also difficult to forecast these changes with any certainty. As such, the future baseline assumes that the objectives of the WFD waterbodies are achieved and that the proposed Project would need to demonstrate that it would not prevent these future objectives from being met.

10.8.25. Marine Sediment Quality

100. Climate change is not expected to have any effect on composition of sediment fractions, nor any measurable influence on the distribution of seabed sediments.

10.8.26. Benthic ecology

101. Milford Haven has had a long history of industrial use with high levels of shipping traffic during which time disturbance to the marine environment has been high, including long-term anthropogenic impacts such as sediment contamination from oil spills (Carey et al., 2015) and pollution from wastewater discharge and agricultural runoff (Langston et al., 2012). In addition, the Celtic Sea and the Bristol channel are also exposed to high levels of shipping activity due to the placement of ports, including Milford Haven, on their coastlines.

102. The Milford Haven Waterway Environmental Surveillance Group has been monitoring and surveying the local environment for 30 years, including the benthos and infauna. These surveys have shown community composition of the rocky shore in Milford Haven and surrounding coastlines to experience increases in non-native species including the small red algae (*Caulacanthus okamurae*) (Archer-Thomson and Morrell, 2020). Numbers of black-footed limpets (*Patella depressa)* have also increased in comparison to the common limpet (*Patella vulgata*) in line with predictions of changes in relative abundance based on a warming climate.

103. There is significant uncertainty surrounding the impacts of climate change on benthic ecology around the UK, particularly for sediment substrates as these are often highly dynamic in nature with associated benthic ecology exhibiting significant natural variability. Changes in sea temperature may have a small effect on the abundance and distribution of certain species.

104. However, although detectable changes in baseline conditions may be observed over the lifetime of the proposed Project, these are not anticipated to occur prior to completion of installation and so there would be no change to the assessment of impacts for this phase of

the Proposed Project. Any changes during operation and maintenance and decommissioning are likely to be small and are therefore not expected to alter the conclusions of the assessments.

10.8.27. Freshwater ecology

105. The Offshore Energy Strategic Environmental Assessment 3 (OESEA 3) (DECC 2016), reports that there have been substantial changes in the fish communities in the north-east Atlantic over several decades. Fish species will undergo natural variation in population size, largely as a result of year-to-year variation in recruitment success. These population trends will be influenced by human exploitation (i.e. over fishing) and broad-scale climatic and hydrological variations.

106. As well as coming under severe pressure from anthropogenic factors (i.e. fishing), fish communities are likely to be affected by future climate change through a rise in sea temperatures. Climate change may influence fish distribution and abundance by affecting growth rates, recruitment rates, behaviour, survival and responses to changes at other trophic levels.

107. Habitat requirements are likely to play a significant role in vulnerability to climate change, with demersal spawning species such as herring being vulnerable at different stages in their life-cycles. For shellfish species, it is expected that a change in sea temperatures will affect the settlement of bivalve species and could alter the distribution of migratory crustaceans.

108. A decline in sandeel populations around the UK has been adversely correlated with a rise in sea temperatures. In addition, increasing freshwater temperatures over the past four decades have implications for the survival rates of juvenile diadromous fish, although not necessarily negative ones. Salmon populations have been declining as a result of warmer sea temperatures, while twaite shad and sea lamprey demonstrate increased larval survival due to warmer temperatures.

109. Although rising sea temperatures can have adverse effects on certain individual fish species i.e. sandeel, assessments have also found that species richness in the seas around the UK has increased. The increase in species richness, along with an increase in small southerly species is possibly influenced by the release of predation pressure from large, exploited commercial fish, acting in combination with the changing climate.

110. Many fish are subject to pressure from commercial fisheries which target commercially valuable species and, potentially, non-target species. It is expected that fishing pressure will enhance the effects of climate change. This has already been observed off the southwest coast of Britain, where commercially exploitable warm water species (i.e. skates and rays) have been unable to respond to more favourable conditions due to increased fishing pressure.

111. From the above it is expected that fish species observed within the Study Area will respond differently to pressures from climate change and commercial fishing. Species like salmon and sandeel are likely to decline, whereas populations of sea lamprey and twaite shad are likely to increase. Corresponding to a rise in sea temperatures, southern warm water fish species are likely to increase their distribution northwards. However, this increase is likely to be counteracted by an increase in fish exploitation.

10.9 Screening assessment

112. In this section a screening assessment against Clearing the Waters for All exemptions is undertaken. In addition, it includes the screening assessment based on a ZoI approach to determine whether there is a potential pathway by which the waterbodies in the Study Area

could be impacted, and whether there are any exempt activities related to the construction or operation of the proposed Project that do not require assessment.

113. The WFD waterbodies identified within the Study Area relevant to the screening and further assessment are:

- Milford Haven Inner (GB531006114100) – Transitional;
- Milford Haven Outer (GB641008220000) – Coastal; and
- Pembrokeshire South (GB611008590003) – Coastal.

10.9.28. Screening against Clearing the Waters for All exemptions

114. In accordance with Environment Agency Clearing the Water guidance for All (Environment Agency, 2016), a scoping assessment is not required if the proposed activity meets any one of several criteria that indicate the activity is low risk. The screening criteria are listed in **Table 10D-13,** alongside assessment of whether the proposed Project meets the criteria.

Table 10D-13. Screening criteria from the Environment Agency Clearing the Waters Guidance

Screening criteria	Screening assessment
A self-service marine licence activity or an accelerated marine licence activity that meets specific conditions.	The proposed Project is not applicable for a self-service or accelerated marine licence activity.
Maintaining pumps at pumping stations – if you do it regularly, avoid low dissolved oxygen levels during maintenance and minimise silt movement when restarting the pumps.	Not applicable
Removing blockages or obstacles like litter or debris within 10 m of an existing structure to maintain flow.	Not applicable
Replacing or removing existing pipes, cables or services crossing over a waterbody – but not including any new structure or supports, or new bed or bank reinforcement.	The offshore elements of the proposed Project will require new crossings over (or under) waterbodies rather than replacement or removal, and so is not exempt from further assessment.
'Over water' replacement or repairs to, for example bridge, pier and jetty surfaces – if you minimise bank or bed disturbance.	The offshore elements of the proposed Project will require new crossings over (or under) waterbodies rather than replacement or removal, and so is not exempt from further assessment.

10.9.29. Zone of Influence

115. The proposed Project section of this report (**Section 10.1.2**) provides a description of the proposed Project from which, all offshore potential pathways to an impact, and ZoIs have been identified. The ZoI for Marine Water and Sediment Quality is outlined in **Figure 10D-2**.

116. WFD waterbodies have been screened into this assessment using a ZoI approach and on the basis of whether they are a designated WFD waterbody within the ZoI and so could be directly or indirectly impacted.

117. **Table 10D-14** below sets out the pathways to an effect, the extent of the ZoI and the waterbodies that are directly within the ZoI.

118. Detailed information on pathways to an effect and appraisal of potential impacts can be found in **Chapter 18: Marine Water and Sediment Quality**; **Chapter 17: Physical Environment**; **Chapter 19: Benthic Ecology**; and **Chapter 20: Fish and Shellfish**.

Table 10D-14. ZoI's and relevant WFD waterbodies

Potential pathway	ZoI and basis for determination	Relevant waterbodies	Adjacent / Other water bodies
Construction / Decommissioning			
Identified potential impacts to physical environment: • Potential Increases in suspended sediment concentration (SSC) and associated changes to seabed substrate; • Potential changes to sediment transport systems by changes in waves and current climate; • Potential changes to the morphology of the seabed Including from scour; and • Potential changes in morphology of the coast. **Identified potential impacts to sediments and water quality:** • Installation surveys (changes in turbidity, release of bacteria, release of contaminants); • Route clearance activities (changes in turbidity, release of bacteria, release of contaminants); • General construction in the marine environment (pollution events); • Cable burial activities (changes in turbidity, release of bacteria, release of contaminants); • Anchor deployment (changes in turbidity, release of bacteria, release of contaminants); • Horizontal Directional Drilling (HDD) activities (changes in turbidity, release of bacteria, release of contaminants); and • HDD drilling fluid use (drilling fluid leaks). **Identified potential impacts to fish and benthic ecology:** • Direct loss and physical disturbance to benthic and fish habitats and species; • Permanent direct loss of fish habitats; • Temporary increase in SSC and sediment deposition leading to contaminant mobilization, turbidity and smothering effects; • Temporary physical disturbance to fish and shellfish habitats and	All waterbodies within the extent of one spring tidal excursion limit. This is considered to represent the maximum distance that any measurable plume effects could extend to, or the maximum area for deleterious substances to disperse within, in the marine environment	Milford Haven Outer (GB641008220000) Pembrokeshire South (GB611008590003)	The adjacent waterbody is Milford Haven Inner (GB531006114100), outside the ZoI and so is not considered further

Potential pathway	ZoI and basis for determination	Relevant waterbodies	Adjacent / Other water bodies
species from increased in SSC and sediment deposition. • Changes to marine water quality from the use of HDD drilling fluids and resuspension of sediment contamination during seabed installation works; • Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils; • Underwater sound and vibration; and • Introduction and spread of INNS via vessel hull or ballast water.			
Operations			
Identified potential impacts to physical environment: • Potential changes to sediment transport systems by changes in wave and current climate; • Potential changes to the morphology of the seabed including from scour; and • Potential changes in morphology of the coast. **Identified potential impacts to sediments and water quality:** • Operational temperature increases (changes in bacterial activity); and • Cable maintenance (changes in turbidity, release of bacteria, release of contaminants, pollution events). **Identified potential impacts to fish and benthic ecology:** • Disturbance to marine receptors due to subsea cable thermal emissions; • Temporary increase in SSC and sediment deposition leading to contaminant mobilization, turbidity and smothering effects; • Alteration and / or indirect loss of habitat during the operational lifetime, including from the introduction of hard substrate resulting in increased heterogeneity and new biological communities, on-going scour, changes in hydrodynamics, increased sedimentation and	All waterbodies within the extent of one spring tidal excursion limit. This is considered to represent the maximum distance that any measurable plume effects could extend to, or the maximum area for deleterious substances to disperse within, in the marine environment	Milford Haven Outer (GB641008220000) Pembrokeshire South (GB611008590003)	The adjacent waterbody is Milford Haven Inner (GB531006114100), outside the ZoI and so is not considered further

Potential pathway	ZoI and basis for determination	Relevant waterbodies	Adjacent / Other water bodies
smothering, and abrasions from the movement of catenary chains; • Disturbance to benthic habitats during planned maintenance and instances of cable failure, excavation and disturbance from movement of catenary chains; • Aggregation of fish and associated effects such as barrier effects, collision and entanglement from the presence of floating offshore structures and associated tethering systems; • Effects of underwater sound and vibration; • Effects of electromagnetic field (EMF) emissions; • Effects to fish and shellfish from maintenance activities; and • Introduction and spread of INNS			

10.9.30. Summary

119. The assessment indicated that a screening assessment is required for this activity with the following waterbodies screened in for scoping:

- Pembrokeshire South (GB611008590003) – Coastal; and
- Milford Haven Outer (GB641008220000) – Coastal.

120. Milford Haven Inner (GB531006114100) – Transitional waterbody is screened out as it is outside of the ZoI, defined by the extent of one spring tidal excursion limit. However, this waterbody is considered in terms of impacts generated from the onshore environment (e.g. runoff of sediments or spillages) in **Appendix 10C: Onshore Water Framework Directive Assessment.**

10.10 Scoping assessment

10.10.31. Overview

121. A scoping assessment is carried for the coastal waterbodies identified in **Section 10.9** in this section. This is required to determine which receptors may be impacted by the proposed Project, and therefore need to be assessed in the WFD impact assessment. These receptors are defined in accordance with the Environment Agency Clearing the Waters Guidance (Environment Agency, 2016) and are based on the waterbody's quality elements; the receptors include:

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

122. The scoping assessment also considers INNS.

123. The assessment is made taking into consideration good practice mitigation (measures that would occur with or without input from the WFD assessment process) embedded mitigation measures (measures that can reasonably be incorporated into the design of the proposed works).

124. A CEMP will be produced for the proposed Project. This will outline best practice guidance and relevant documents which the proposed Project will adhere to. In addition, a Water Quality and Pollution Management Plan will be produced for the proposed Project, which will describe the measures to put in place to prevent pollution. The cable layout design will incorporate guidance such as OSPAR Commission (2012) Guidelines on BEP in Cable Laying and Operation.

125. Embedded mitigation measures to be applied to the proposed Project are included in **Table 10D-15**.

Table 10D-15: Embedded Mitigation Measures, Management Plans and Best Practice

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Design Embedded Measures	
Pollution Prevention – adoption of a CEMP and good practice measures during construction	Prior to construction starting onsite, a Construction Environmental Management Plan (CEMP) will be prepared by the Contractor. An Outline CEMP is presented in **Appendix 4A** detailing mitigation measures to be adopted during construction, including those relating to pollution prevention. The CEMP would outline the measures necessary to avoid, prevent and reduce adverse effects where possible upon the marine water environment. The Final CEMP would be supported by a Water Quality and Pollution Management Plan, detailing in further detail the measures required to protect the water environment.
	The CEMP will need to be reviewed, revised and updated as the project progresses towards construction to ensure all potential impacts and residual effects are considered and addressed as far as practicable, in keeping with available good practice at that point in time.
	Best practice guidance will be adopted and outlined in the CEMP. This would include Guidance for Pollution Prevention (GPP) (Netregs, n.d.): • GPP1: General guide to preventing pollution (October 2020); • GPP2: Above ground oil storage tanks (January 2018); • GPP5: Works and maintenance in or near water (February 2018); • GPP6: Working at construction and demolition sites (2012); GPP21: Pollution incidence response planning (June 2021). • GPP22: Dealing with spills; and • GPP26: Safe storage – drums and intermediate bulk containers. Additional good practice would include CIRIA C744 (2015) Coastal and marine environmental site guide (second edition).
	Fuel, equipment and construction materials will be stored appropriately so as to minimise the risk of pollution which could adversely affect marine water and sediment quality. The following measures will be implemented to prevent spillage of hazardous materials: • Storage of all chemicals in secure designated areas with impermeable bunding (generally to 110 % of the volume);

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
	• Double skinning of pipes and tanks containing hazardous materials; • Development of a Spill Response Plan and provision and maintenance of spill response equipment; • Completion of a COSHH assessment for hazardous materials; • Development of a COSHH Register documenting materials stored and handling requirements; • Segregation of COSHH raw material stores and COSHH waste stores; • Protection of hazardous materials in locked containers to minimise the ingress of rainwater and secure them against accidental damage; • Staff training in the use of spill kits and the correct disposal of used material; • Maintenance of a log of any incidents; and • Inspection of all construction plant and machinery on a daily basis to check for fuel and oil leaks.
	A water quality monitoring programme will be in place pre-construction and during the construction phase. This will ensure that mitigation measures are operating as planned, are preventing pollution, and in a pollution event ensuring that quick identification and implementation of appropriate action in line with the Emergency Response Plan. The monitoring will involve a combination of daily observations and monitoring, and regular water quality sampling on a periodic basis, or ad-hoc (depending on circumstances). The exact programme is to be determined by the Principal Contractor in consultation with NRW and other relevant stakeholders. This requirement is secured within **Appendix 4A: Outline CEMP**.
	Disposal of sewage and other waste will be undertaken in a manner which complies with all regulatory requirements, including but not limited to the IMO MARPOL requirements.
Drilling and piling – to follow good practice protocols	Offshore drilling, piling and dredging for foundation (anchor) installation, trenching for cable burial, and HDD are common marine activities with associated good practice protocols. Mitigation of unnecessary environmental impact is usually embedded in this process, in the design, selection and function of the equipment, and the normal usage methodology and protocols.
Drilling fluid – to be suitably selected to minimise environmental damage	HDD drilling fluids will be tested and selected to curtail environmental damage and potential leakage. This chiefly includes using biodegradable substances that 'Pose Little or No Risk to the Environment' (PLONOR) and adequate contamination testing and drilling fluid disposal.
Cable Burial Risk Assessment – to minimise sediment disturbance where possible	A Cable Burial Risk Assessment (CBRA) will be produced post-consent which will detail the minimum burial depths of the offshore export cables throughout the offshore export cable routes, and indicative proposed locations where the target depth of burial may not be achievable and external protection is expected to be required. The CBRA will also detail which

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
	type of cable protection measure would be located at which locations and will seek to minimise the amount of sediment disturbance to as little as possible. Connecting the turbines to one another to string a single export cable back to shore (rather than a cable per turbine).
Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice	Scour protection and other protection measures for buried or seabed surface laid infrastructure are common infrastructure in the marine environment. The engineering design of such protection (in terms of the armour unit or clast material and dimensions, and the overall shape and structure of the protection), will take account of the environmental setting it is being located in. Good engineering design practice will actively minimise the potential for local sediment erosion (causing scour), accretion (causing burial) and general interaction with ambient flows (to minimise the potential for erosion of the protective clasts and thus increases in suspended sediment concentrations).
Adoption of appropriate third party vessel communication and management to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality.	Effective communication between vessels in the area throughout all stages of the proposed Project (pre lay surveys, installation, maintenance, and operation) using Notices to Mariners, Kingfisher Bulletins, Navigational Telex (NAVTEX), and NAVAREA warnings. This will reduce the likelihood of accidents or collisions at sea, which could result in fuel spills, adversely affecting marine water quality.
Installation vessel requirements to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality.	500 m safety distances will be adopted around installation vessels. The presence of a guard vessel around the installation area perimeter will be required. All vessels will follow all international regulations governing safety at sea: • International Regulations for Preventing Collisions at Sea 1972 (COLREGS) • International Convention for the Safety of Life at Sea 1974 (SOLAS) • All vessels will follow the International Convention for the Prevention of Pollution from Ships (MARPOL). This will include shipboard oil pollution emergency plans (SOPEP). All of these measures will reduce the likelihood of accidents or collisions at sea, which could result in fuel spills, adversely affecting marine water quality.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Site and routing selection and design to minimise potential for disturbance	Taking account of, and avoiding, potential hazards such as bathymetric features including rocks and sandbanks, shipping lanes and military exercise areas wherever possible will reduce the potential for spills or leaks occurring into the marine environment from collision with vessels (which can adversely affect marine water quality). Sensitive ecological, physical, and archaeological receptors within the Offshore Development Area will also be considered. This will be informed by pre installation surveys (see below).
	Surveys will follow NRW guidance including 'Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects'.
Turbine and substructure installation to be undertaken by appropriate vessels in appropriate sea / weather conditions	Ensure the seaworthiness of the turbine and substructure transport to the Array Area, which will subsequently reduce the likelihood of spills or leaks occurring in the marine environment (which can adversely affect marine water quality). This will include a check of towing calculations, condition and specification of the towing equipment, emergency procedure by a Marine Warranty Surveyor. Above all suitable weather and sea state should be present for the transportation and installation of the turbines (windspeed 17 m/s or less, wave height less than 5 m in height).
Appropriate excavation techniques to minimise adverse effects such as increased turbidity	To prevent disturbance by suspended sediment on benthic habitats in the jet trenching phase of cable installation 'OSPAR Commission Guidelines on Best Environmental Practice' in Cable Laying and Operation must be adhered to. This includes to minimise the number of export cables that require trenching, avoiding sensitive benthic habitats in the route design wherever possible.
All project vessels shall adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011).	Adhering to these guidelines will help with the aim of preventing the spread of marine INNS
All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO, 2017);	Adhering to the convention will help comply with the aim of preventing the spread of marine INNS

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Management Plans	
Water Quality and Pollution Management Plan	The measures in this plan will be put in place to prevent pollution to the water environment. Despite some of these measures being aimed at terrestrial water bodies, due to connectivity to the marine environment these measures are also deemed relevant to preventing adverse effects on marine water quality.

Decomissioning Environmental Management Plan	Under Section 105 of the Energy Act 2004 (as amended) (UK Parliament, 2004), developers of offshore renewable energy projects are required to prepare a Decommissioning Programme for approval by the Regulator and a Section 105 notice is issued to developers by the Regulator following receipt of consent. Developers are then required to submit a detailed plan for the decommissioning of the project, including anticipated costs and financial securities.
	
	The decommissioning strategy will consider:
	
	• The Best Practicable Environmental Option, which is the option that delivers the most benefit or least damage to the environment at an acceptable cost, both in the short and long term. This involves balancing the reduction in environmental risk with practicability and the cost of reducing the risk:
	  • Safety of surface and subsurface navigation;
	  • Other uses of the sea; and
	  • Health and safety considerations.

126. Further information on good practice and embedded mitigation can be found in Chapter 18: Marine Water and Sediment Quality; Chapter 19: Benthic Ecology; and Chapter 20: Fish and Shellfish.

10.10.32. Pembrokeshire South (GB611008590003) Waterbody

127. The scoping assessment of the potential effects to receptors within Pembrokeshire South is provided in **Table 10D-16** below.

Table 10D-16. Scoping assessment of risks to hydromorphology for Pembrokeshire South (GB611008590003) Waterbody

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Hydromorphology				
Could impact on the hydromorphology (e.g., morphology or tidal patterns) of a waterbody at high status	Na – waterbody not at high status.		No	Pembrokeshire South waterbody is at good overall status. This is therefore scoped out of further assessment.
Could significantly impact the hydromorphology of any waterbody	Morphology of the seabed at Freshwater West could theoretically be impacted by HDD excavation and drilling operations. The magnitude of impact is predicted to be (no greater than) low. Where direct disturbance takes place to the beach / shallow sub-tidal seabed (e.g., via trenching), the impact will only be present for the duration of the construction works and will therefore be temporary in nature. Sediment disturbance will occur during construction, operation, and decommissioning phases. Sediment resuspension is expected during installation surveys, route clearance activities, cable burial activities,	When considering embedded mitigation and the mitigation outlined for each individual element assessed (**Chapter 18: Marine Water and Sediment Quality and Table 10D-15**), no significant effects were identified. Embedded mitigation includes: Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15).** Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).** Disturbance from cable protection and scour protection installations	No	No significant effects in hydromorphology were identified for any of the project phases. As such, any residual hydromorphological impact is not considered significant at the scale of the Pembrokeshire South WFD waterbody and would not lead to deterioration or prevention of future improvement. On this basis it is considered that hydromorphology can be scoped out of additional detailed assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	anchor deployment, HDD activities, cable maintenance and cable removals and protection measures. Sediment plume extent will be largely restricted to the ZoI and it is expected for the majority of any sediment plume to settle out within a number of seconds to minutes.	– to be minimised through good engineering design practice (**Table 10D-15).** Drilling and piling – to follow good practice protocols (**Table 10D-15).** Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
Is in a waterbody that is heavily modified for the same use as your activity	Na – waterbody is not designated heavily modified.		No	Pembrokeshire South waterbody WFD waterbody is not designated heavily modified. This is therefore scoped out of further assessment.
Water Quality				
Could affect water clarity, temperature, salinity, oxygen levels, nutrients, or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Water quality could be affected due to an increase in turbidity levels, release of contaminants and leaks and spillage.	When considering embedded mitigation and the mitigation outlined for each individual element assessed (**Chapter 18: Marine Water and Sediment**	No	Increases in suspended sediment concentrations would occur during construction and decommissioning phases (up to 24 months and 12 months respectively), and intermittent during

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	Sediment disturbance will increase turbidity though similarly to hydromorphology, no significant effects were identified from sediment disturbance within **Chapter 18: Marine Water and Sediment Quality**. With regard to chemicals, water quality in the area is generally good but does exceed the WFD saline EQS for a number of chemicals. None of the potential impacts within each project phase is expected to contribute towards increasing the levels of any of these chemicals which already exists. Fluid leaks during HDD drilling or pollution events during general construction in the marine environment could lead into impacts on water quality. However, when considering the rapid dispersal of any minor spill within the area, it is unlikely for any leak or spill of a scale associated with the proposed Project to worsen levels of existing chemicals	**Quality**), no significant effects were identified. Embedded mitigation includes: Drilling fluid – to be suitably selected to minimise environmental damage (**Table 10D-15).** Adoption of appropriate third party vessel communication and management to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15**). Installation vessel requirements to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15**). Site and routing selection and design to minimise potential for disturbance (**Table 10D-15**). Turbine and substructure installation to be undertaken by appropriate vessels in appropriate		the operational phase (30 years), during maintenance operations. Given this, the proposed preparatory works and the implementation of best practice, no impact on water quality would be expected at the scale of the WFD waterbody, and risks to water quality can be scoped out of further, more detailed assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	in the area, nor prevent WFD objectives in the area from being achieved. Due to the temporary and localised nature of any impacts and the fact that these will rapidly disperse through the water column, the magnitude of impact is considered to be negligible.	sea / weather conditions (**Table 10D-15**). Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
Is in a waterbody with a phytoplankton status of moderate, poor or bad	Na– phytoplankton status is good.		No	Na– phytoplankton status is good.
Is in a waterbody with a history of harmful algae	Na – There is no history of harmful algae in this waterbody.		No	Na – There is no history of harmful algae in this waterbody.
If your activity uses or releases chemicals (for example through sediment disturbance or building works), are the chemicals on the Environmental Quality Standards Directive (EQSD) list?	From analysis of baseline water quality data, there are a number of instances where EQS are exceeded for the area. When considering the rapid dispersal of any minor spill within the area, it is unlikely for any leak or spill of a scale associated with the proposed Project to worsen levels of existing chemicals in the area, nor prevent WFD	As outlined above mitigation has been incorporated into the proposed Project to minimise sediment disturbance and prevent pollution events from happening. Drilling fluid – to be suitably selected to minimise	No	Given the good practice and embedded mitigation and the rapid dispersal within the area, there are not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more detailed assessment can be scoped out.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	objectives in the area from being achieved. Therefore, more detailed assessment can be scoped out.	environmental damage (**Table 10D-15**). Adoption of appropriate third party vessel communication and management to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15**). Installation vessel requirements to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15**). Site and routing selection and design to minimise potential for disturbance (**Table 10D-15).** Turbine and substructure installation to be undertaken by appropriate vessels in appropriate sea / weather conditions (**Table 10D-15**). Good practice will be followed in all aspects of construction, operation and decommissioning,		

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
If your activity uses or releases chemicals (for example through sediment disturbance or building works), does it disturb sediment with contaminants above Cefas Action Level 1?	Sediments in the near vicinity of the proposed Project site have been found to exceed Cefas Action Level 1 for a number of contaminants and in one instance exceed Cefas Action Level 2. Any effect from the disturbance of minimal sediment to facilitate the main works it is considered would be short-lived and highly localised in nature (ZoI).	Although impacts would not be anticipated at the WFD watercourse scale, the embedded mitigation will be applied: Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15**). Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).** Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15**). Drilling and piling – to follow good practice protocols (**Table 10D-15).**	No	Similar to above, given the good practice and embedded mitigation and the rapid dispersal within the area, there are not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more detailed assessment can be scoped out.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		Site and routing selection and design to minimise potential for disturbance (**Table 10D-15**). Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
If your activity has a mixing zone, (like a discharge pipeline or outfall) are the chemicals released on the Environmental Quality Standards Directive (EQSD) list?	Na – The activity is not associated with a mixing zone (for example from a discharge pipeline or outfall).	n/a	No	Na – The activity is not associated with a mixing zone (for example from a discharge pipeline or outfall).
Biology: Marine habitats				
Is the footprint of the activity 0.5 km^2 or larger? - Yes	More than 0.5 km^2 of the proposed Project footprint lies within Pembrokeshire South waterbody. The proposed Project boundary does not lie within the Milford Haven Outer.	n/a	Yes	The offshore development footprint is higher than 0.5 km^2 within the Pembrokeshire South waterbody and therefore it should be scoped in for further assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
				In addition, it should be noted that the ZoI being applied for is larger than the actual footprint of eventual works.
Is the footprint of the activity 1 % or more of the waterbody's area? - No	The portion of the proposed Project offshore boundary covers approximately 3 % of Pembrokeshire South waterbody.	n/a		The portion of the proposed Project offshore boundary in the waterbody area is higher than 1 %. When considering the ZoI, the proportion covered increases up to approximately 30 %. Therefore, it should be scoped in for further assessment.
Is the footprint of the activity within 500m of any higher sensitivity habitat? - No	There are no higher sensitivity habitats within 500 m of the activity footprint.	n/a		The closest higher sensitivity habitats to the Offshore Project Boundary are maerl beds and intertidal seagrass within Milford Haven Outer, located approximately 5 km from the offshore proposed Project boundary.
Is the footprint of the activity 1 % or more of any lower sensitivity habitat? - No	The portion of the proposed Project offshore boundary, covered by lower sensitivity habitats is lower than 1 %.	n/a		The offshore footprint of the proposed Project overlaps with rocky reef habitats, however, the coverage is less than 1 %. Nonetheless as the requirements above are not met, marine habitats should be scoped in for further assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Biology: Fish				
Is the activity in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary?	Temporary physical disturbance to fish and shellfish habitats and species from increased SSC and sediment deposition will occur during short periods. Fish migration and movement between important areas such as spawning and feeding grounds could be impacted. The predominant sediment in the Study Area is sand, with small proportions of mud and gravel. Therefore, this is considered to be a temporary impact with sediment likely to settle to the seabed within hours of the disturbance.	Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15**). Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15**). Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15**). Drilling and piling – to follow good practice protocols (**Table 10D-15**).	No	Any measurable change in suspended sediment concentrations will be temporary and localised, with the majority of sediment consisting of sands and gravels and therefore expected to have deposited on the seabed between 50 m – 500 m away of the source of disturbance. The potential effects on each of the fish and shellfish that have been identified within the proposed Project site are expected to be negligible.
Could the activity impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Fish migration and movement between important areas such as spawning and feeding grounds could also be impacted. Nonetheless, the significance of the impact of physical disturbance to and / or temporary loss of habitat is to be	Reducing physical disturbance as far as possible through good practice: Appropriate excavation techniques to minimise adverse	No	The potential impact for each pathway on each of the fish and shellfish that have been identified within the proposed Project site are expected to be negligible.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	minor. Permanent direct loss of fish habitats is also deemed minor. Temporary physical disturbance to fish and shellfish habitats and species from increased SSC, sediment deposition is expected to not be significant as different species could tolerate high levels of SSC and deposition. In addition, assessment of impacts during operational and decommissioning phases are deemed to be not significant.	effects such as increased turbidity (**Table 10D-15**). Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15**). Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15**). Drilling and piling – to follow good practice protocols (**Table 10D-15).**		
Could the activity cause entrainment or impingement of fish	No. Not applicable. No intake associated with offshore windfarm facility.	n/a	No	No risk of entrainment or impingement.
Protected areas				
Is the activity within 2 km of any WFD protected area?	The Pembrokeshire South waterbody overlaps the Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA, and both the Pembrokeshire South and Milford Haven Outer waterbodies	Mitigation measures outlined in **Table 10D-15** will be implemented to ensure that there are no adverse effects on WFD protected areas. Specifically, site and routing selection and design will take in to	No	Receptors are considered to be of high sensitivity. However, due to the temporary and localised nature of any impacts and the fact that these will rapidly disperse through the water column, the magnitude of impact is

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	overlap with the Pembrokeshire Marine / Sir Benfro Forol SAC and the West Wales Marine / Gorllewin Cymru Forol SACs. The proposed Project footprint overlaps with 1 Designated Bathing Waters (Dale, ID 10011) within the Milford Haven Outer waterbody. Within 2 km of the tidal excursion there is Castlemartin Coast SPA.	consideration the protected area, to minimise potential for disturbance. Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		considered to be negligible to WFD protected areas and detailed impact assessment is not required.
Invasive non-native species (INNS)				
Could the activity introduce or spread INNS	Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive aquatic species.	All project vessels shall adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011) (**Table 10D-15).** All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and	No	Given the good practice and embedded mitigation, there is not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more detailed assessment can be scoped out

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		Sediments (IMO, 2017) (**Table 10D-15**).		

10.10.33. Milford Haven Outer (GB641008220000) Waterbody

128. The scoping assessment of the potential effects to receptors within Milford Haven Outer is provided in **Table 10D-17** below.

Table 10D-17. Scoping assessment of risks to hydromorphology for Milford Haven Outer (GB641008220000) Waterbody

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Hydromorphology				
Could impact on the hydromorphology (e.g., morphology or tidal patterns) of a waterbody at high status	Na – waterbody not at high status.		No	Milford Haven Outer WFD waterbody is at moderate status. This is therefore scoped out of further assessment.
Could significantly impact the hydromorphology of any waterbody	No direct works will be undertaken within the Milford Haven Outer waterbody though it is within the tidal excursion limit, where sediments or pollution plumes effects could extend. Sediment disturbance will occur during installation, operation, and decommissioning phases. Sediment resuspension is expected during installation surveys, route clearance activities, cable burial activities, anchor deployment, HDD activities, cable maintenance and cable removals and protection measures. Sediment plume extent will be largely restricted to the ZoI and it is expected for the majority of any	When considering embedded mitigation and the mitigation outlined for each individual element assessed (**Chapter 18: Marine Water and Sediment Quality and Table 10D-15**), no significant effects were identified. Embedded mitigation includes: Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15).** Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).**	No	No significant effects in hydromorphology were identified for any of the project phases. As such, any residual hydromorphological impact is not considered significant at the scale of the Pembrokeshire South WFD waterbody and would not lead to deterioration or prevention of future improvement. On this basis it is considered that hydromorphology can be scoped out of additional detailed assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	sediment plume to settle out within a number of seconds to minutes.	Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15).** Drilling and piling – to follow good practice protocols (**Table 10D-15).** Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
Is in a waterbody that is heavily modified for the same use as your activity	Na – waterbody is not designated heavily modified.		No	Milford Haven Outer WFD waterbody is not designated heavily modified. This is therefore scoped out of further assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Water Quality				
Could affect water clarity, temperature, salinity, oxygen levels, nutrients, or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	No direct works will be undertaken within the Milford Haven Outer waterbody though it is within the tidal excursion limit, where sediments or pollution plumes effects could extend. Water quality could be affected due to an increase in turbidity levels, release of contaminants and leaks and spillage. Sediment disturbance will increase turbidity though similarly to hydromorphology, no significant effects were identified from sediment disturbance. With regard to chemicals, water quality in the area is generally good but does exceed the WFD saline EQS for a number of chemicals. None of the potential impacts within each project phase is expected to contribute towards increasing the	When considering embedded mitigation and the mitigation outlined for each individual element assessed (**Chapter 18: Marine Water and Sediment Quality**), no significant effects were identified. Embedded mitigation includes: Drilling fluid – to be suitably selected to minimise environmental damage (**Table 10D-15).** Adoption of appropriate third party vessel communication and management to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15).** Installation vessel requirements to reduce risk of accidents and collisions which may lead to	No	Increases in suspended sediment concentrations would occur during construction and decommissioning phases (up to 24 months and 12 months respectively), and intermittent during the operational phase (30 years), during maintenance operations. Given this, the proposed preparatory works and the implementation of best practice, no impact on water quality would be expected at the scale of the WFD waterbody, and risks to water quality can be scoped out of further, more detailed assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	levels of any of these chemicals which already exists. Fluid leaks during HDD drilling or pollution events during general construction in the marine environment could lead into impacts on water quality. However, when considering the rapid dispersal of any minor spill within the area, it is unlikely for any leak or spill of a scale associated with the proposed Project to worsen levels of existing chemicals in the area, nor prevent WFD objectives in the area from being achieved. Due to the temporary and localised nature of any impacts and the fact that these will rapidly disperse through the water column, the magnitude of impact is considered to be negligible.	spillage and deterioration of water quality (**Table 10D-15).** Site and routing selection and design to minimise potential for disturbance (**Table 10D-15).** Turbine and substructure installation to be undertaken by appropriate vessels in appropriate sea / weather conditions (**Table 10D-15).** Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
Is in a waterbody with a phytoplankton status of moderate, poor or bad	Na– phytoplankton status is good.		No	Na – phytoplankton status is good.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Is in a waterbody with a history of harmful algae	Na – There is no history of harmful algae in this waterbody.		No	Na – There is no history of harmful algae in this waterbody.
If your activity uses or releases chemicals (for example through sediment disturbance or building works), are the chemicals on the Environmental Quality Standards Directive (EQSD) list?	From analysis of baseline water quality data, there are a number of instances where EQS are exceeded for the area. When considering the rapid dispersal of any minor spill within the area, it is unlikely for any leak or spill of a scale associated with the proposed Project to worsen levels of existing chemicals in the area, nor prevent WFD objectives in the area from being achieved. Therefore, more detailed assessment can be scoped out.	As outlined above mitigation has been incorporated into the proposed Project to minimise sediment disturbance and prevent pollution events from happening. Drilling fluid – to be suitably selected to minimise environmental damage (**Table 10D-15).** Adoption of appropriate third party vessel communication and management to reduce risk of accidents and collisions which may lead to spillage and deterioration of water quality (**Table 10D-15).** Installation vessel requirements to reduce risk of accidents and collisions which may lead to	No	As outlined above mitigation has been incorporated into the proposed Project to minimise sediment disturbance and prevent pollution events from happening. Given the good practice and embedded mitigation and the rapid dispersal within the area, there are not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more detailed assessment can be scoped out.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		spillage and deterioration of water quality (**Table 10D-15).** Site and routing selection and design to minimise potential for disturbance (**Table 10D-15).** Turbine and substructure installation to be undertaken by appropriate vessels in appropriate sea / weather conditions (**Table 10D-15).** Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
If your activity uses or releases chemicals (for example through sediment disturbance or building works), does it disturbs sediment with contaminants above Cefas Action Level 1?	Raw data provided by NRW has been summarised and is available in **Appendix 18B**. The sediment at this location (within the Milford Haven Waterway), exceeds Cefas Action Level 1 for a number of	Although impacts would not be anticipated at the WFD watercourse scale, the embedded mitigation will be applied:	No	Similar to above, given the good practice and embedded mitigation and the rapid dispersal within the area, there are not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	determinands. Cefas Action Level 2, however, is only exceeded for levels of cadmium. This sampling point is located much further up the estuary than where works are proposed to take place. Any effect from the disturbance of minimal sediment to facilitate the main works it is considered would be short-lived and highly localised in nature (ZoI).	Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15).** Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).** Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15).** Drilling and piling – to follow good practice protocols (**Table 10D-15).** Site and routing selection and design to minimise potential for disturbance (**Table 10D-15).** Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and		detailed assessment can be scoped out.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
If your activity has a mixing zone, (like a discharge pipeline or outfall) are the chemicals released on the Environmental Quality Standards Directive (EQSD) list?	Na – The activity is not associated with a mixing zone (e.g. discharge pipeline or outfall).		No	Na – The activity is not associated with a mixing zone.
Biology: Marine habitats				
Is the footprint of the activity 0.5 km^2 or larger? - Yes	The proposed Project boundary does not lie within the Milford Haven Outer but the northern extent of the ZOI does overlap with the water body, and the footprint of the activity surpasses 0.5 km^2.	n/a	Yes	The Offshore Development footprint is higher than 0.5 km^2 and therefore it should be scoped in for further assessment.
Is the footprint of the activity 1 % or more of the waterbody's area? - No	The proposed Project boundary does not lie within the Milford Haven Outer waterbody.	n/a		Even though the proposed Project boundary itself does not lie within the Milford Haven Outer water body, the ZoI does overlap sufficiently for this to be scoped in for further assessment.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
Is the footprint of the activity within 500 m of any higher sensitivity habitat? - No	There are no higher sensitivity habitats within 500 m of the activity footprint.	n/a		The closest higher sensitivity habitats to the Offshore Project Boundary are maerl beds and intertidal seagrass within Milford Haven Outer, located approximately 5 km from the offshore proposed Project boundary.
Is the footprint of the activity 1 % or more of any lower sensitivity habitat? - No	The portion of the proposed Project offshore boundary, covered by lower sensitivity habitats is lower than 1 %.	n/a		The offshore footprint of the proposed Project overlaps with rocky reef habitats, nonetheless the coverage is less than 1 %. Nonetheless as the requirements above are not met, marine habitats should be scoped in for further assessment.
Biology: Fish				
Is the activity in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary?	Temporary physical disturbance to fish and shellfish habitats and species from increased SSC and sediment deposition will occur during short periods. Fish migration and movement between important areas such as spawning and feeding grounds could be impacted.	Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15).** Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).**	No	Any measurable change in suspended sediment concentrations will be temporary and localised, with the majority of sediment consisting of sands and gravels and therefore expected to have deposited on the seabed between 50 m – 500 m away of the source of disturbance.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	The predominant sediment in the Study Area is sand, with small proportions of mud and gravel. Therefore, this is considered to be a temporary impact with sediment likely to settle to the seabed within hours of the disturbance.	Disturbance from cable protection and scour protection installations – to be minimised through good engineering design practice (**Table 10D-15).** Drilling and piling – to follow good practice protocols (**Table 10D-15).**		The potential effects on each of the fish and shellfish that have been identified within the proposed Project site are expected to be negligible and not significant.
Could the activity impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Fish migration and movement between important areas such as spawning and feeding grounds could also be impacted. Nonetheless, the significance of the impact of physical disturbance to and / or temporary loss of habitat is to be minor. Permanent direct loss of fish habitats is also deemed minor. Temporary physical disturbance to fish and shellfish habitats and species from increased SSC, sediment deposition is expected to not be significant as different species could tolerate high levels of SSC and deposition. In	Reducing physical disturbance as far as possible through good practice: Appropriate excavation techniques to minimise adverse effects such as increased turbidity (**Table 10D-15).** Cable Burial Risk Assessment – to minimise sediment disturbance where possible (**Table 10D-15).** Disturbance from cable protection and scour protection installations – to be minimised	No	The potential impact for each pathway on each of the fish and shellfish that have been identified within the proposed Project site are expected to be negligible and not significant.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	addition, assessment of impacts during operational and decommission phases are deemed not significant.	through good engineering design practice (**Table 10D-15).** Drilling and piling – to follow good practice protocols (**Table 10D-15).**		
Could the activity cause entrainment or impingement of fish	No. Not applicable. No intake associated with offshore windfarm facility.	n/a	No	No risk of entrainment or impingement.
Protected areas				
Is the activity within 2 km of any WFD protected area?	The Pembrokeshire South waterbody overlaps the Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA, and both the Pembrokeshire South and Milford Haven Outer waterbodies overlap with the Pembrokeshire Marine / Sir Benfro Forol SAC and the West Wales Marine / Gorllewin Cymru Forol SACs. The proposed Project footprint overlaps with 1 Designated Bathing	Mitigation measures outlined in **Table 10D-15** will be implemented to ensure that there are no adverse effects on WFD protected areas. Specifically, site and routing selection and design will take in to consideration the protected area, to minimise potential for disturbance. Good practice will be followed in all aspects of construction, operation and	No	Receptors are considered to be of medium sensitivity. Due to the temporary and localised nature of any impacts and the fact that these will rapidly disperse through the water column, the magnitude of impact is considered to be negligible. Given that water quality and sediment quality are both considered medium receptors, this will result in a negligible effect that is not significant.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
	Waters (Dale, ID 10011) within the Milford Haven Outer waterbody. Within 2km of the tidal excursion there is Castlemartin Coast SPA.	decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan. Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Construction and Environmental Management Plan (CEMP) and a Water Quality and Pollution Management Plan.		
Invasive non-native species (INNS)				
Could the activity introduce or spread INNS	Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive aquatic species.	All project vessels shall adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011) (**Table 10D-15).**	No	Given the good practice and embedded mitigation, there is not anticipated to be any adverse impacts on the scale of the WFD waterbody, and further, more detailed assessment can be scoped out.

Risk	Risk assessment	Proposed Mitigation	Requires Detailed Impact Assessment?	Risk Issue(s)
		All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO, 2017) (**Table 10D-15).**		

10.11 WFD assessment

129. Within this section, the WFD receptors identified in **Section 10.10**, will be assessed following the Stage 3 methodology described in **Section 10.5.8**, in order to assess whether the proposed Project will lead to a significant non-temporary deterioration in the biological: habitats element.

10.11.34. No Deterioration Assessment

130. The first stage of the assessment is to consider the likely impact of the offshore proposed Project on WFD parameters and whether it is likely to cause deterioration of any WFD quality elements or prevent Natural Resources Wales mitigation measures from being implemented.

131. The appraisal of these two WFD objectives is considered under the following sub-sections.

10.11.35. Potential construction phase impacts

132. During the construction phase the following environmental impacts affecting habitats may occur if appropriate mitigation is not applied.

- Direct loss and physical disturbance to benthic habitats and species;
- Temporary increase in SSC and sediment deposition leading to contaminant mobilization, turbidity and smothering effects;
- Changes to marine water quality from the use of HDD drilling fluids;
- Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils; and
- Introduction and spread of INNS via vessel hull or ballast water.

133. Overall, habitats could be affected by direct loss of habitats, water quality and sediment disturbance and introduction of INNS. Proposed mitigation is described in section below.

10.11.36. Construction phase mitigation

134. A CEMP will be produced for the proposed Project. This will outline best practice guidance and relevant documents which the proposed Project will adhere to. Additionally, the CEMP will outline site-wide mitigation that will be followed. To preventing / reducing adverse effects on marine water and sediment quality the below list of guidance and measures will apply. A full description of these is included in **Chapter 18: Marine Water and Sediment Quality** and **Table 10D-15**.

- General Guidance and Best Practice Measures
- Storage of Plant Materials
- Environmental Inductions
- Specialist training
- Water Quality Monitoring Programme
- Water Quality and Pollution Management Plan

135. To minimise the direct loss of habitats and additional environmental impacts, a significant amount of work has been undertaken to select an Array Area and OfECC route that avoid a number of constraints and seabed features (see **Chapter 03: Alternatives**). This work has taken the form of surveys and desk-based assessments. However, due to the timescales between the initial assessment and the commencement of the offshore construction, further information will need to be acquired prior to finalisation of detailed design for the proposed

Project. Thus, surveys and activities will be undertaken prior to the installation of turbines and export cables. The surveys will consist of Geophysical and geotechnical surveys & Unexploded Ordnance (UXO) survey. In terms of activities, the following will be undertaken:

- **Route clearance activities, which may include:**
    - **Pre-lay grapnel run:** Depending on a review of site data along the export cable route, a pre-lay grapnel run will be undertaken by a fishing vessel (or similar) to confirm the complete clearance of any abandoned fishing equipment or other debris.
    - **Boulder clearance:** Where boulders are present within the cable route, dedicated boulder grab equipment will be used to move larger boulders (more than 30 cm) approximately 15 m perpendicular to the cable route. The boulders would be relocated within the Offshore Cable corridor Boundary and no boulders will be removed from the seabed during this operation.

136. Scour protection and other protection measures for buried or seabed surface laid infrastructure are common infrastructure in the marine environment. The engineering design of such protection (in terms of the armour unit or clast material and dimensions, and the overall shape and structure of the protection), will take account of the environmental setting it is being located in. Good engineering design practice will actively minimise the potential for local sediment erosion (causing scour), accretion (causing burial) and general interaction with ambient flows (to minimise the potential for erosion of the protective clasts).

137. To minimise potential seabed disturbance and associated turbidity during seabed excavation in the installation phase, embedded design control measures have been defined to reduce impacts. The following measures and guidance will be incorporated into the cable layout design (including the OSPAR Commission (2012) Guidelines on BEP in Cable Laying and Operation):

- Connecting the turbines to one another to string a single export cable back to shore (rather than a cable per turbine);
- Minimising the cable route to shore as far as possible;
- Selecting installation techniques which minimise seabed disturbance as far as possible; and
- Designing the OfECC route to avoid sensitive habitats (designated Annex 1 reef and Annex 1 sandbanks in particular) where practical and providing appropriate buffers to protect sensitive areas from accretion of suspended sediment;

138. Further investigation, including an appropriate level of site investigation will be undertaken to ensure optimal burial methods are selected for the cable installation activities (from the techniques described above). A cable burial risk assessment will be undertaken pre installation.

139. In terms of water quality and sediment disturbance, activity-specific embedded mitigation and good practice measures are outlined in **Table 10D-18** below.

Table 10D-18. Activity-specific embedded mitigation for the proposed Project relevant to water quality and sediment disturbance

Activity	Embedded mitigation commitment
Third party vessel communication and management	Effective communication vessels in the area throughout all stages of the project (pre lay surveys, installation, maintenance, and operation) using Notices to Mariners, Kingfisher Bulletins, Navigational Telex (NAVTEX), and NAVAREA warnings. This will reduce the likelihood of accidents or collisions at sea, which could result in fuel spills, adversely effecting marine water quality.
Installation vessel requirements	• 500 m safety distances around installation vessels. • The presence of guard vessel around the installation area perimeter. • All vessels will follow all international regulations governing safety at sea: • International Regulations for Preventing Collisions at Sea 1972 (COLREGS) • International Convention for the Safety of Life at Sea 1974 (SOLAS) • All vessels will follow the International Convention for the Prevention of Pollution from Ships (MARPOL). This will include Shipboard Oil Pollution Emergency Plans (SOPEP).
Site and routing selection and design	Taking account of, and avoiding, potential hazards such as bathymetric feature such as rocks and sandbanks, shipping lanes and military exercise areas will reduce the chance of spills or leaks occurring into the marine environment from collision with vessels (which can adversely affect marine water quality). It will also consider sensitive ecological, physical, and archaeological receptors within the ZoI of the project. This will be in line with NRW guidance including 'Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform Environmental Impact Assessment (EIA) of Major Development Projects'. It will also be informed by pre installation surveys.
Turbine Installation	Ensure the seaworthiness of the turbine transport to the Array Area, which will subsequently reduce the likelihood of spills or leaks occurring in the marine environment (which can adversely affect marine water quality). The involve a check of towing calculations, condition and specification of the towing equipment, emergency procedure by a Marine Warranty Surveyor. Above all suitable weather and sea state should be present for the transportation and installation of the turbines (windspeed 17 m/s or less, wave height less than 5 m in height).
Excavation techniques and turbidity	To minimise disturbance by suspended sediment on benthic habitats in the jet trenching phase of cable installation 'OSPAR Commission Guidelines on Best Environmental Practice' in Cable Laying and Operation must be adhered to. This includes to 71 minimize the number of export cables that require trenching, avoiding sensitive benthic habitats in the route design and coordinating trenching activity to not coincide with critical life stages of benthic species such as reproductive events like spawning.
Drilling Fluid*	HDD drilling fluids will be tested and selected to curtail environmental damage and potential leakage. This chiefly includes using biodegradable substances that Pose Little or No Risk to the Environment (PLONOR) and adequate contamination testing and drilling fluid disposal.

140. To minimise the likelihood of introduction of INNS the following embedded measures are proposed:

- All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine INNS (IMO, 2017); and

- All project vessels shall adhere to the IMO Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011).

10.11.37. Construction phase assessment

141. In areas of predominantly sandy sediment and sandbanks, like the proposed Project, and particularly in shallow waters, there is regular natural disturbance of the seabed due to wave action and the tidal cycle. Therefore, communities inhabiting such environments are considered to be relatively tolerant of disturbance. Most animals will be sediment dwelling and will be disturbed as those sediments are ploughed or jetted aside to an adjacent location. As sediments are displaced and backfilled there will be some mortality of larger and less mobile species but for many animals, displacement will have only a temporary impact, and fauna will be able to redistribute within the sediment once the installation spread has moved away. Recovery of habitats is expected to be relatively rapid.

142. Any measurable change in suspended sediment concentrations will be temporary and localised, with the majority of sediment consisting of sands and gravels. Gravels are expected to have deposited on the seabed between 0 m to 50 m and sands between 50 m to 500 m away of the source of disturbance. In terms of fines, 0 m to 50 m from any area of disturbance will be the zone with the highest SSC increase (tens to hundreds of thousands of mg/l). 50 m to 500 m would see a zone of measurable SSC increase (hundreds to low thousands of mg/l). The increase in SSC between 0 to 500 m would last for the duration of active disturbance plus up to 30 minutes following end of disturbance. Fine sediment is unlikely to deposit in measurable thickness. Several methods are incorporated into the cable layout design to minimise turbidity during the installation phase of the proposed Project. Mobilisation of sediment-bound contaminants can also occur during periods of increased SSC. However, through rapid dilution and dispersion due to water movement through the Study Area, there are expected to be no resultant detectable increases in sediment bound contaminants during Installation activities. Therefore, the effect of increases in sediment-bound contaminants to benthic receptors are not considered to be significant, and with the proposed mitigation in place, it is not expected that there would be an impact to the water quality element.

143. During HDD, due to the small amounts of fluid, if any, likely to be released, it is only anticipated that a temporary local reduction in water quality at the HDD breakout may occur. Due to the dynamic nature of the intertidal environment, any fluid is expected to be rapidly diluted and dispersed within the marine environment. Therefore, only receptors in the immediate vicinity of the HDD breakouts are likely to be in contact with drilling fluids, which pose little risk to the environment. With the proposed mitigation in place, it is not expected that there would be an impact to the water quality element.

144. In terms of leaks and spills from vessels, with the mitigation measures in place, the risk of an accidental leak or spill is considered unlikely. However, should it occur, the leak or spill is expected to be minor, localised and temporary with only small amounts of pollutant released into the marine environment which will be subject to immediate dilution and dispersion over the tidal cycle. With the proposed mitigation in place, it is not expected that there would be an impact to the water quality element.

145. No INNS were identified in the Study Area during the benthic characterisation study. However, benthic surveys conducted for Project Erebus identified several INNS towards the mouth of Milford Haven (Marine Space Ltd, 2019a). It is not anticipated that any hard substrate will be placed around the mouth of Milford Haven for the proposed Project due to the route that the

cable will follow. With mitigation and best practice measures in place, it is not expected that there would be an impact to the biology (fish) quality element.

146. Overall, the likely impact of the installation phase for the offshore proposed Project on WFD parameters is likely to cause no deterioration of any WFD quality elements or prevention of any future improvement of the WFD element at the waterbody scale.

10.11.38. Potential operation phase impacts

147. During the operational phase the following environmental impacts may occur if appropriate mitigation is not applied.

- Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity and smothering effects;
- Alteration and / or indirect loss of habitat during the operational lifetime, including from the introduction of hard substrate resulting in increased heterogeneity and new biological communities, on-going scour, changes in hydrodynamics, increased sedimentation and smothering, and abrasions from the movement of catenary chains;
- Disturbance to benthic habitats during planned maintenance and instances of cable failure, excavation and disturbance from movement of catenary chains;
- Disturbance to benthic habitats and species due to subsea cable thermal emissions;
- Effects of Electromagnetic Field (EMF) emissions; and
- Introduction and spread of INNS.

10.11.39. Operation phase mitigation

148. During any required repairs or reburial, equipment similar to that used in the Construction Phase will be used.

149. Scour protection and other protection measures for buried or seabed surface laid infrastructure are common infrastructure in the marine environment. The engineering design of such protection (in terms of the armour unit or clast material and dimensions, and the overall shape and structure of the protection), will take account of the environmental setting it is being located in. Good engineering design practice will actively minimise the potential for local sediment erosion (causing scour), accretion (causing burial) and general interaction with ambient flows (to minimise the potential for erosion of the protective clasts).

150. Maintenance and cable repair activities during instances of cable failure, excavation and disturbance from movement of catenary chains, where required, will be carried out using the same or similar methods as the Installation Phase activities, and therefore the potential pathways for impact to benthic ecology are expected to be the same as those identified for the Installation Phase of the proposed Project.

151. To minimise the likelihood of introduction of INNS the following embedded measures are proposed:

- All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine INNS (IMO, 2017); and
- All project vessels shall adhere to the IMO Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011).

152. Cable maintenance activities will be required which will result in the use of vessels. The number of vessels required will be less than during the construction phase,

10.11.40. Operational phase assessment

153. Temporary increase in SSC could occur during cable repairs and / or the remedial reburial of exposed cables that may be required during the operational lifetime of the proposed Project. Due to the expected shorter period of time over which repairs would take place compared to the Installation activities, any local increases in SSC and therefore contaminants, turbidity and smothering will be no greater than that associated with Installation.

154. The installation of cable protection berms left in place for the operational phase; and the placement of floating platforms and associated mooring / anchoring systems could result in the alteration and / or loss of habitat during its operational lifetime. In addition to changes in the biological community, the addition of anthropogenic structures on the seabed can lead to on-going scour throughout the duration of the operational phase. However, on-going scour is not expected to cause changes to the seabed. The seabed in the areas within which cable protection may be required are naturally highly mobile areas and therefore benthic receptors are considered to have some habituation to localised disturbance from scour and the associated movement of sediment or loss of habitat. Small areas of Annex I Reefs and biogenic reefs and fragile sponge and anthozoans may be temporarily lost due to scour. However, the highly mobile nature of the area suggests that any local disturbance or loss of habitat due to scour will be followed by recovery, with the seabed expected to continually return to baseline conditions when scouring occurs. Therefore, it is not expected that there would be an impact to the biology (habitat) quality element.

155. Maintenance works are likely to be highly localised to the area of concern and therefore the spatial extent of any impacts would be small in extent. Furthermore, any maintenance or repairs works would be of a significantly shorter duration. The only exception is where rock protection would be required (where previously rock was not placed) as part of maintenance and cable repair works to achieve cable protection when trenching is not possible. In the event of additional placement of external protection on the seabed, further permanent physical disturbance to and / or loss of benthic habitats would likely arise. The impact on benthic receptors from the movement of catenary chains during the operational lifetime of the proposed Project has been assessed as not significant. Movement of chains during planned maintenance is not expected to occur on a larger scale than during the normal operation of the proposed Project. Therefore, it is not expected that there would be an impact to the biology (habitat) quality element.

156. The predominantly sandy habitats present in the Array Area and Offshore Project Boundary support a wide variety of habitats and biotopes which could be directly affected by increased sediment temperature. However, whilst the sediment surrounding the cable may be heated there is negligible capability to heat the overlying water column because of the very high heat capacity of water, meaning there would be no effects on epibenthic communities, such as the Annex I reef habitats and other habitats present in the Study Area including fragile sponges and blue mussels, and these are therefore not considered further. In addition, the effect of thermal emissions from the proposed Project on subtidal and sublittoral sands and gravels is not expected to cause any impact to the biology (fish) quality element.

157. EMF will be emitted for the duration of operational life of the proposed Project, from both the export and the inter-array cables. Results from the project-specific EMF assessment (EMF Modelling Report) found that the effects of EMF reduce with distance from the cable, and the

modelling shows negligible emissions beyond a distance of 2 m for this burial depth. Where burial is greater this distance will be further reduced. At crossings with other power cables, the potential increase in EMF is higher. However, the area where cables cross and interact is very small and as EMF reduces with distance any increase is also expected to be highly localised. For dynamic exposed cables in the water column, a distance of 0.44 m from the cable surface EMF is approximately equal to background levels. Given that emissions are considered to be negligible beyond 2 m from the cable route, and benthic invertebrate species are considered to have a low sensitivity to EMF, the effects are considered negligible and therefore not significant.

158. No INNS were identified in the Study Area during the benthic characterisation study but there are INNS recorded in Milford Haven so some dispersion is possible. With mitigation and best practice measures in place, the introduction and subsequent risk of INNS is considered unlikely and with a minor magnitude and therefore not significant.

159. Overall, the likely impact of the operational phase for the offshore proposed Project on WFD parameters is likely to cause no deterioration of any WFD quality elements or prevention of any future improvement of the WFD element at the waterbody scale.

10.11.41. Potential decommissioning phase impacts

160. Potential effects during decommissioning are anticipated to be the same as route preparation and cable installation.

161. At the end of the operational life of the array and electricity export cables, the options for decommissioning will be evaluated. Other proposed Project constraints will also be taken into consideration (e.g. safety and liability), with the least environmentally damaging option chosen if possible.

162. The full details of the proposed decommissioning will not be agreed until towards the end of the 30-year operational lifetime of the proposed Project. However, the decommissioning phase is expected to largely mirror the installation process over a time period of 12 months (see **Chapter 04: Description of the Proposed Project**).

163. There are several options for the removal of cable and scour protection once the cable has been decommissioned. The type of cable protection to be used has not yet been decided. However, Natural England (2022) presents options for the removal of grout bags and concrete mattresses during decommissioning, both of which are being considered as material for concrete mattressing for the proposed Project.

164. The Assessment is based on the worst case for decommissioning, considering the removal of all infrastructure. However, there is an option to leave grout bags in-situ following decommissioning as they often decompose over time and no longer have lifting points attached (Natural England, 2022). Therefore, the integrity of the bag could cause issues during removal. However, grout bags are recyclable and often easy to remove if removed before decomposition has occurred. Thus, an alternative option is partial or total removal depending on the condition of the bag using cranes with ROV assistance or subsea grapples and lifting baskets. This can cause minor temporary disturbance to benthic ecology but is not expected to exceed any impacts caused during the installation or operation phase.

165. Full removal of all infrastructure is considered in this assessment. Nonetheless, it should be noted that concrete mattresses are often left in-situ following decommissioning as they are not designed for end-of-life removal (Natural England, 2022). Therefore, if a cable is left in place following removal, the concrete mattressing is also often left in place.

166. Partial or full removal of concrete mattressing can be attempted using several techniques including subsea grapples, lifting blankets, speed-loaders and high payload wet store systems (Natural England, 2022). Each technique has varying success in removing concrete mattresses, but the impacts resulting from this are expected to be minor, with some loss of biodiversity possible if species have colonised the hard artificial substrate. However, impacts are not expected to be any greater than those during installation and operation.

167. As a result, the impacts of the decommissioning stage are not expected to exceed impacts of the installation or operational phase. Therefore, all impacts associated with decommissioning are considered to be in line with those of the construction phase.

10.11.42. Mitigation measures / Reasons for Not Achieving Good Status (RNAGS)

168. No mitigation measures have been provided by Natural Resources Wales specifically for Pembrokeshire South or Milford Haven Outer WFD waterbodies. Nonetheless a number of Local Actions (Committed) and Future Aims stated to apply to 'Multiple' waterbodies within Cleddau / Milford Haven Operational Catchments have been identified. These can be found in **Annex 10D-A Further WFD waterbody information.**

169. As such, consideration has been given to the potential impact of the proposed Project on the pressures and RNAGS that can be viewed on Water Watch Wales (NRW, 2023) website. There are no RNAGS for Pembrokeshire South WFD waterbody as it is already in good condition. RNAGS for Milford Haven Outer WFD waterbody are shown in **Table 10D-19** below.

Table 10D-19. RNAGs identified within the WFD waterbodies in the Study Area

Waterbody Name	Class Element	SWMI	Activity	Business Category	Sector	Project impact on RNAG's
Milford Haven Outer	Dissolved Inorganic Nitrogen	Diffuse source	Farm infrastructure	Agriculture and rural land management	-	Agricultural sector is not relevant to the proposed Project and therefore will not be impacted.
Milford Haven Outer	Dissolved Inorganic Nitrogen	Diffuse source	Unknown (pending investigation)	Agriculture and rural land management	-	Agricultural sector is not relevant to the proposed Project and therefore will not be impacted.
Milford Haven Outer	Dissolved Inorganic Nitrogen	Point source	Sewage discharge (continuous)	Water Industry	Waste water treatment	Unlikely to be impacted by the proposed Project. The activity is not associated with a mixing zone (for example from a

Waterbody Name	Class Element	SWMI	Activity	Business Category	Sector	Project impact on RNAG's
						discharge pipeline or outfall).
Milford Haven Outer	Dissolved Inorganic Nitrogen	Point source	Sewage discharge (intermittent)	Water Industry	-	Unlikely to be impacted by the proposed Project. The activity is not associated with a mixing zone (for example from a discharge pipeline or outfall).
Milford Haven Outer	Dissolved Inorganic Nitrogen	Point source	Unsewered domestic sewage	Domestic / General public	Domestic / General public	Unlikely to be impacted by the proposed Project. The activity is not associated with a mixing zone (for example from a discharge pipeline or outfall).
Milford Haven Outer	Mercury and Its Compounds	Diffuse source	Atmospheric deposition	Other (not in list)	-	Unlikely to be impacted by the proposed Project.
Milford Haven Outer	Mercury and Its Compounds	Diffuse source	Contaminated waterbody bed sediments	Industry, Manufacturing and other Business		Construction activities could potentially add to atmospheric pollution but impacts may be short-term

10.11.43. Conclusions and recommendations

170. This assessment has considered the potential impacts and associated mitigation of the proposed Project on the basis of information currently available in relation to the WFD quality elements of the following surface water bodies:

- Milford Haven Outer (GB641008220000) – Coastal;

- Pembrokeshire South (GB611008590003) – Coastal; and

171. The assessment demonstrates that the proposed Project is compliant with the objectives of the WFD: it would not cause deterioration in status of the water bodies and would not prevent the water bodies achieving Good Ecological Status and Good Ecological Potential.

172. Further assessment or updates may be required if there are material changes to the design elements post planning or it is determined that proposed embedded mitigation cannot be implemented as currently proposed for whatever reason.

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ANNEX 10D-A FURTHER WFD WATERBODY INFORMATION

173. The following WFD waterbodies have been identified within the Study Area:

- Pembrokeshire South (GB611008590003); and
- Milford Haven Outer (GB641008220000);

174. None of these waterbodies have been designated as HMWB.

10.12 River Basin District Objectives and measures

175. RBMP Measures and objectives have been reviewed for Western Wales RBD, in particular within Milford Haven & Pembrokeshire South Operational Catchments. These are Local Actions (Committed) and Future Aims. Among these, there are a number of measures stated to apply to 'Multiple' waterbodies, though within Cleddau / Milford Haven Operational Catchments, noting no specific measures have been defined for the waterbodies within the Study Area. A summary of the Local Actions and Future Aims that apply to multiple waterbodies within the Cleddau / Milford Haven Operational Catchments is provided below in **Table A 1** and **Table A-2** respectively.

Table A 1. Local Actions (Committed) identified within Milford Haven & Pembrokeshire South Operational Catchments

Local Action (Committed)	Environmental Objective this is relevant to	Challenge/ Pressure it addresses	Sector(s) who will implement action	Main Driver (National Measures)
Fisheries Habitat and River Restoration Plan Actions (Cleddau / Milford Haven)	Improving fish population & resilience; Good Ecological Status / Potential; Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); WFD Regulations Protected Area Objective; Well-being duty	Pollution from rural areas; Physical modifications; Nature emergency; Negative effects of INNS; European site protected area; Barriers to Well-being	NRW / NGO / Agriculture	European site thematic action – physical modification
Installation of a fish pass (Cleddau / Milford Haven)	Good Ecological Status / Potential; Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); Improving fish population & resilience; WFD Regulations Protected Area Objective	Physical modifications; Nature emergency; European site protected area	NRW	Fisheries
Innovative solutions for nutrient reduction (Cleddau / Milford Haven)	Good Ecological Status / Potential; WFD Regulations Protected Area Objective;	Pollution from rural areas; Nature Emergency; Flood and Coastal Resilience; European site protected area	NRW / Pembs Coastal Forum	Agriculture
Action to reduce phosphate in Afonydd Cleddau SAC	Good Ecological Status / Potential; WFD Regulations Protected Area Objective;	Pollution from rural areas; Pollution from wastewater; Drinking water protected area; European site protected area	NRW / Water Company / Local Authority / Agriculture	European site thematic action – Agri

Local Action (Committed)	Environmental Objective this is relevant to	Challenge/ Pressure it addresses	Sector(s) who will implement action	Main Driver (National Measures)
4 Rivers for LIFE (Cleddau)	Good Ecological Status / Potential; WFD Regulations Protected Area Objective; Well-being duty; Improving fish population & resilience; Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); Good Chemical Status	Pollution from rural areas; Barriers to Well-being; Nature Emergency; Physical modifications; European site protected area	NRW / Others	European site thematic plan – physical modification

Table A-2. Future Aims identified within Milford Haven & Pembrokeshire South Operational Catchments

Future Aims (Potential Local Action)	Environmental Objective this is relevant to	Challenge / Pressure it addresses	Sector who could potentially implement
Progress to the next stage of actions identified within the Pembroke and Afonydd Cleddau River Restoration Plans and the Eastern and Western Cleddau Fisheries Habitat Restoration Plans	Good Ecological Status / Potential; WFD Regulations Protected Area Objective; Environment (Wales) Act (SMNR/Biodiversity and resilience of ecosystems); Improving fish population & resilience; Well-being duty	Nature Emergency; European site protected area; Barriers to Well-being	NRW / NGO / Others
Establish a collaborative Opportunity Catchment Partnership to address water quality issues including nutrient and sediment pollution and channel structure	Good Ecological Status / Potential; WFD Regulations Protected Area Objective; Environment (Wales) Act (SMNR / Biodiversity and resilience of	Pollution from wastewater; Pollution from rural areas; European site protected area	NRW / NGO / Agriculture / Water Industry / Landowners / Others

Future Aims (Potential Local Action)	Environmental Objective this is relevant to	Challenge / Pressure it addresses	Sector who could potentially implement
and function (including barriers to fish passage and habitat management and also deliver wellbeing benefits	ecosystems); Improving fish population & resilience; Well-being duty; Good Chemical Status		
Work with partners to continue to progress innovative approaches and solutions to incentivise behavioural change that will address nutrient failures and enable sustainable economic development. This could include opportunities for Payment for Ecosystem Service (PES) that builds upon previous project work	WFD Regulations Protected ; Well-being duty, WFD Protected Area Objective; Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); Good Chemical Status; Good Ecological Status / Potential	Pollution from rural areas; Barriers to Well-being; Nature Emergency; European site protected area	NRW / NGO / Agriculture / Water Industry / Landowners / Others
Work with Public Services Boards (PSBs) and local communities through community councils, to raise greater awareness of water quality issues and their impact on the catchment's water bodies. Encouraging local stewardship and working collaboratively to achieve more resilient ecosystems better able to tackle the challenges of a changing climate thereby minimising pollution risk	WFD Regulations Protected ; Well-being duty, WFD Protected Area Objective; Environment (Wales) Act (SMNR/Biodiversity and resilience of ecosystems); Good Chemical Status; Good Ecological Status/Potential	Pollution from rural areas; Barriers to Well-being; Nature Emergency; European site protected area	PSBs / NRW / Local community / Others
Work with planning processes, SuDS Approval Bodies (SABs) and partners to meet NRW's obligations as a statutory	Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems)	Nature Emergency; Pollution from towns, cities and transport	NRW / Others

Future Aims (Potential Local Action)	Environmental Objective this is relevant to	Challenge / Pressure it addresses	Sector who could potentially implement
consultee on SuDS approvals (subject to required funding), identify future opportunities for retro-fitting green infra-structure and rural SuDS to deliver multiple benefits including water efficiency.			
Work with Dŵr Cymru to explore actions to work towards all domestic effluent in the catchment being screened for microplastics.	Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems)	Pollution from wastewater	Water Industry / NRW / Others
Explore opportunities and possible protection measure for native oyster restoration areas (Milford Haven Coastal Waterbodies only)	Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); WFD Regulations Protected Area Objective	Nature Emergency; European site protected area	NRW / Others
Work with the Relevant Authorities Group to investigate the possibility of making the voluntary 'No anchoring Zones' in the Milford Haven Waterway into a byelaw to protect seagrass and maerl. (Milford Haven Coastal Waterbodies only)	Environment (Wales) Act (SMNR / Biodiversity and resilience of ecosystems); WFD Regulations Protected Area Objective	Nature Emergency; European site protected area	NRW / Relevant Authorities / Others
Future Aims (Potential Local Action)	Environmental Objective this is relevant to	Challenge / Pressure it addresses	Sector who could potentially implement

10.13 A.3 Cycle 2 (2019) and Cycle 3 (2021) WFD Classification

10.13.44. Pembrokeshire South (GB611008590003) WFD Classification

176. Details of Cycle 2 (2019) and Cycle 3 (2021) WFD Classification items for Pembrokeshire South (GB611008590003) are provided in **Table A 3** below.

Table A 3. Pembrokeshire South (GB611008590003) Coastal WFD Waterbody Cycle 2 (2019) and Cycle 3 (2021)

Classification element	Cycle 2 2019 Classification	Cycle 3 2021 Classification
Overall Waterbody Status	Good	Good
Overall Ecological Status	Good	Good
Overall Chemical	Good	High
Biological Quality Elements	-	Good
Fish	-	-
Inverts	Good	Good
IQI	-	Good
Imposex	Good	Good
Phytoplankton	High	High
Angiosperm	-	-
Saltmarsh Subelement	-	-
Seagrass Subelement	-	-
Macroalgae	-	-
Opportunistic Macroalgae Subelement	-	-
Fucoid Extent	-	-
Rocky Shore Macroalgae Subelement	-	-
Eco_Gen	High	High
DIN	High	High
DO	High	High
Eco_HM	High	High
Hydro	-	-
Morphology	High	High
Specific Pollutants	Not Assessed	Not Assessed
Arsenic	-	-
Chrom VI	-	-
Copper	-	-
Dimethoate	-	-
Iron	-	-
Linuron	-	-
Manganese	-	-
Permethrin	-	-
Phenol	-	-
Phenol_2_4	-	-
Toluene	-	-
Triclosan	-	-
UI_NH3	-	-
Zinc	-	-
Chem_PHZ	Not Assessed	Not Assessed
Anthracene	-	-

Classification element	Cycle 2 2019 Classification	Cycle 3 2021 Classification
BDPE Calc	-	-
Cadmium	-	-
Dioxins	-	-
Endosulfan	-	-
HBCDD	-	-
Heptchlr	-	-
Hex_chl_bu	-	-
Hex_chl_bz	-	-
Hex_chl_cx	-	-
Mercury	-	-
Noyphenol	-	-
PAH	-	-
PAH_Conf	-	-
Pen_chl_bz	-	-
PerfluSulp	-	-
TBT_annx10	-	-
Chem_PR	Not Assessed	Not Assessed
Alachlor	-	-
Atrazine	-	-
Benzene	-	-
Benz_pyren	-	-
Cypermeth	-	-
Dichlo_1_2	-	-
Dichlometh	-	-
Dichlorvos	-	-
Diuron	-	-
Flourthene	-	-
Isoprotron	-	-
Lead	-	-
Napthalene	-	-
Nickel	-	-
Octylphen	-	-
Pen_chl_ph	-	-
Simazine	-	-
Tri_chl_bz	-	-
Tri_chl_mh	-	-
Chem_Other	Not Assessed	Not Assessed
Carb_tetra	-	-
DDT_total	-	-
Drins	-	-
Pa_pa_DDT	-	-
Tet_chl_ee	-	-
Tri_chl_ee	-	-

10.13.45. Milford Haven Outer (GB641008220000) WFD Classification

177. Details of Cycle 2 (2019) and Cycle 3 (2021) WFD Classification items for Milford Haven Outer (GB641008220000) are provided in Table A 4 below.

Table A 4. Milford Haven Outer (GB641008220000) Coastal WFD Waterbody Cycle 2 (2019) and Cycle 3 (2021)

Classification element	Cycle 2 2019 Classification	Cycle 3 2021 Classification
Overall Waterbody Status	Moderate	Moderate
Overall Ecological Status	Moderate	Moderate
Overall Chemical	Fail	Moderate
Biological Quality Elements	-	Good
Fish	-	-
Inverts	Good	Good
IQI	Good	Good
Imposex	Good	Good
Phytoplankton	High	Good
Angiosperm	Good	Good
Saltmarsh Subelement	Good	Good
Seagrass Subelement	High	High
Macroalgae	Good	Good
Opportunistic Macroalgae Subelement	Good	Good
Fucoid Extent	-	-
Rocky Shore Macroalgae Subelement	Good	Good
Eco_Gen	Moderate	Moderate
DIN	Moderate	Moderate
DO	High	High
Eco_HM	Not High	Not High
Hydro	-	-
Morphology	Not High	Not High
Specific Pollutants	High	High
Arsenic	High	High
Chrom VI	-	High
Copper	High	High
Dimethoate	-	-
Iron	High	High
Linuron	-	-
Manganese	-	High
Permethrin	-	High
Phenol	-	-
Phenol_2_4	-	-
Toluene	-	High
Triclosan	-	-
UI_NH3	High	High
Zinc	High	High
Chem_PHZ	Moderate	Moderate
Anthracene	-	High
BDPE Calc	-	-
Cadmium	High	High
Dioxins	-	-
Endosulfan	-	High
HBCDD	-	-

Classification element	Cycle 2 2019 Classification	Cycle 3 2021 Classification
Heptchlr	-	-
Hex_chl_bu	-	-
Hex_chl_bz	-	-
Hex_chl_cx	-	High
Mercury	Moderate	Moderate
Noyphenol	High	High
PAH	-	-
PAH_Conf	-	-
Pen_chl_bz	-	High
PerfluSulp	-	-
TBT_annx10	-	High
Chem_PR	High	High
Alachlor	-	-
Atrazine	-	-
Benzene	High	High
Benz_pyren	-	-
Cypermeth	-	High
Dichlo_1_2	-	High
Dichlometh	-	High
Dichlorvos	-	High
Diuron	-	-
Flourthene	-	-
Isoprotron	-	-
Lead	High	High
Napthalene	-	High
Nickel	High	High
Octylphen	-	High
Pen_chl_ph	-	-
Simazine	-	-
Tri_chl_bz	-	High
Tri_chl_mh	High	High
Chem_Other	Not Assessed	High
Carb_tetra	-	-
DDT_total	-	High
Drins	-	High
Pa_pa_DDT	-	-
Tet_chl_ee	-	High
Tri_chl_ee	-	-