LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Environmental Statement

Volume 6: Appendix 20A – Marine Conservation Zone Assessment

August 2024

Prepared by: Llŷr Floating Wind Ltd

FLOVENTIS ENERGY

Document Status

Version	Authored by	Reviewed by	Approved by	Date
FINAL	AECOM	AECOM	AECOM	August 2024

Approval for Issue

Prepared by	AECOM
Prepared for	Llŷr Floating Wind Limited
Approved by	Jay Hilton-Miller

Acronyms and Abbreviations

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
AA	Appropriate Assessment	mm	Millimetre
CBRA	Cable Burial Risk Assessment	MMMU	Marine Mammal Management Unit
CEMP	Construction Environmental Management Plan	MMO	Marine Management Organisation
cm	Centimetre	mT	millitesla
COLREGS	International Regulations for Preventing Collisions at Sea 1972	NRW	Natural Resources Wales
EDR	Effective Deterrent Range	OfECC	Offshore Export Cable Corridor
EMF	Electromagnetic Field		
ES	Environmental Statement	OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
HDD	Horizontal Directional Drilling	PLONOR	Pose Little or No Risk to the Environment
HRA	Habitats Regulations Assessment	PLP	Design Outline Project Array Layout Plan
HVDC	High-Voltage Direct Current	SAC	Special Area of Conservation
IAC	Inter-Array Cables	SBP	Sub-Bottom Profiling
IMO	International Maritime Organisation	SCOS	Scientific Committee On Seals
INNS	Invasive Non-Native Species	SOLAS	International Convention for the Safety of Life at Sea 1974
km	Kilometre	SOPEP	Shipboard Oil Pollution Emergency Plans
LSR	Likely to have a Significant Risk	SPMP	Scour Protection Management Plan
m	Meter	SSC	Suspended Sediment Concentration
MarESA	Marine Evidence-based Sensitivity Assessments	TJB	Transition Joint Bay
MarLIN	Marine Life Information Network	UXO	Unexploded Ordinance
MARPOL	International Convention for the Prevention of Pollution from Ships	WTG	Wind Turbine Generator
MCAA	Marine and Coastal Access Act	ZoI	Zone of Influence
MCZ	Marine Conservation Zone	µT	Microtesla

Glossary of Project Terms

Glossary of Terms	Definition
The Applicant	The developer of the Project, Llŷr Floating Wind Limited
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.
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 on behalf of the Welsh Ministers.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor (OfECC), 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.
OfECC	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall.
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor (OnECC) 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
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).
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.

Contents

List of Figures

List of Tables

20. MCZ ASSESSMENT

20.1 Introduction

1. The Marine Conservation Zone (MCZ) Assessment is submitted in support of the application for the Llŷr 1 Floating Offshore Wind Farms (referred to as the proposed Project) on behalf of Llŷr Floating Wind Limited (hereafter 'The Applicant'). It supports consent applications for the proposed Project to the competent authority (in this case, Natural Resources Wales (NRW) Marine Licensing Team) under the Marine and Coastal Access Act (2009) (MCAA).
2. The information within this report draws upon project, baseline and impact assessment information from the following chapters and appendices from the proposed Project Environmental Statement (ES):

- **Chapter 04: Description of the Proposed Project**;
- **Chapter 17: Physical Environment**;
- **Chapter 19: Benthic Ecology**;
- **Chapter 20: Fish and Shellfish Ecology**;
- **Chapter 21: Marine Mammals**;
- **Appendix 04A: Outline CEMP**;
- **Appendix 04B: INNS Plan**;
- **Appendix 08D: Habitats Regulations Assessment Screening**;
- **Appendix 08D: Habitats Regulations Assessment Report to Inform Appropriate Assessment**;
- **Appendix 19C: EMF Assessment**; and
- **Appendix 21B: Marine Mammals Noise Modelling**.

20.1.1. The Project

3. The proposed Project is a floating offshore wind development within Welsh waters, located 35 km from the northeastern corner of the Array Area to Linley Head (the closest location on the coast of Pembrokeshire) in the Celtic Sea (**Figure 20-1**). The proposed Project will make landfall at Freshwater West before connecting into Pembroke Dock power station and the national grid network.
4. The proposed Project comprises a floating offshore wind development, comprising up to ten wind turbine generators (WTG), inter array cables (IAC) and up to two offshore export cable circuits. The array area covers an outline area of interest of 45 km^2 and includes WTGs, floating platforms (along with associated anchors and mooring lines) and array cables. Each offshore export cable will connect to the respective onshore export cable via a transition joint bay (TJB), from which each onshore export cable will connect to the onshore substation and then on to one single grid connection at Pembroke Dock power station.
5. The proposed Project will comprise of the following key components:

- Offshore infrastructure:
  - Up to 10 WTGs;
  - Up to 10 floating offshore wind platforms and associated moorings;
  - Up to eight mooring lines per platform;

- Either drag embedment anchors or drilled pile anchors, up to eight anchors per platform;
- Up to 11 Offshore IACs with a total length of 17.6 km and up to one subsea connector;
- Up to two electricity export cables which will transfer electricity generated by the WTGs to the onshore cable circuits to the landfall site at Freshwater West - including associated cable protection measures. These will be up to 49 km in length; and
- Other associated infrastructure, such as navigational buoys.

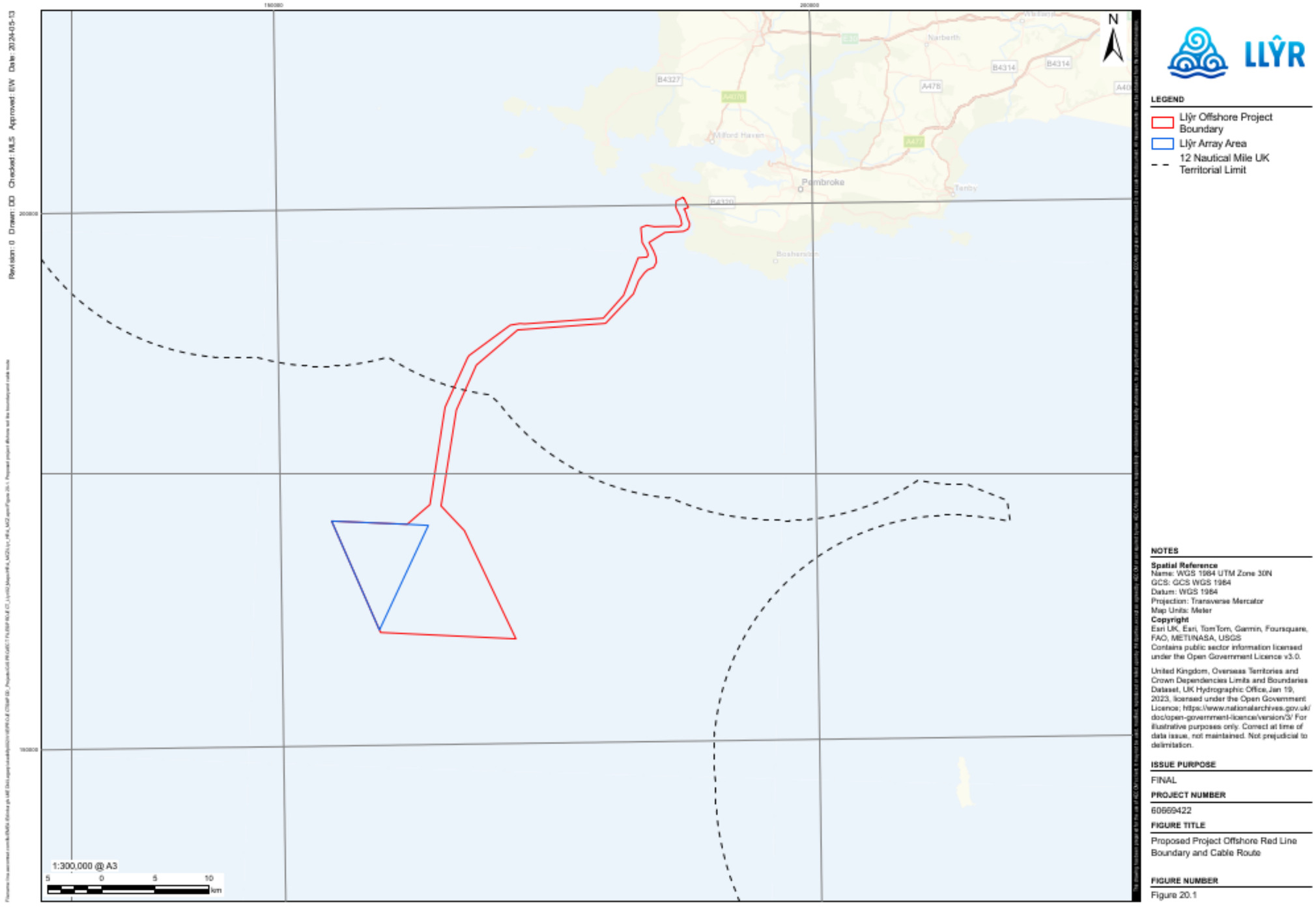

Figure 20-1. Proposed Project offshore red line boundary and cable route

20.1.2. Embedded Mitigation

6. The design of the proposed Project will include embedded design control and mitigation measures that are designed to mitigate potential impacts wherever possible. In addition, several management plans will form conditions to any consent granted and these manage offshore construction, operation and maintenance and decommissioning activities in line with guidance and best practice as well as to further mitigate any potential impacts.
7. The embedded design control and mitigation measures and Management Plans for the proposed Project are presented in **Chapter 04: Description of the Proposed Project - Annex 4B**. A summary of relevant embedded mitigation measures is provided in **Table 20-1**.

Table 20-1. Summary of relevant embedded mitigation measures adopted as part of the proposed Project

Embedded Mitigation Measures	Description
Route selection	Careful routing of the OfECC within the cable corridor to avoid sensitive features including Turbot Bank and St Gowan Shoal.
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. Pre installation 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'.
Project Design – Hazard avoidance	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 EIA of Major Development Projects'. It will also be informed by pre installation surveys.
Pre-Construction drainage plan ('Drainage Strategy')	A pre-construction drainage plan ('Drainage Strategy') will be developed and implemented to minimise water within the trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via the appropriate means to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains.
Pre-construction ecological surveys	Comprehensive pre-installation ecological surveys have been conducted within the array area and offshore export cable route ZoI to identify any potential impacts or hazards.
Pre-construction ROV Survey	An ROV survey of the seabed on the cable route and mooring location will be undertaken immediately prior to the installation of the export cable and FLOW array. This will confirm that no hazardous obstructions or benthic or physical damage prior to the completion of the connection.

Embedded Mitigation Measures	Description
Pre-Construction surveys	Geophysical and geotechnical surveys will be carried out prior to construction across the Array Area and in the OfECC, to gather further information on debris, boulders, presence of seabed features and sediment depth, etc.
Route clearance activities, which may include a pre-lay grapnel run, boulder clearance and pre-sweeping of sand waves.	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. 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. The exact procedure which will be followed for boulder relocation and clearance is to be agreed with NRW post consent. Pre-sweeping of sand waves is usually required to level the seabed.
Sandwave Levelling	To facilitate the construction of the proposed Project, it will also be necessary to level out areas of sandwaves identified on the seabed. Geotechnical and geophysical survey data collected post consent will define the need for sandwave levelling, and it is anticipated following analysis of this survey data that the extent of sandwave levelling will reduce compared to this worst-case scenario.
Unexploded Ordnance (UXO)	Unexploded Ordnance (UXO) survey will be conducted across the array area and the OfECC. These surveys will use a magnetometer to identify potential obstructions relating to maritime UXO. The likely number of UXO and detection methods will be confirmed from the UXO survey prior to the installation of offshore infrastructure. UXO will be avoided where possible. However, if further mitigation such as clearance or detonation is required, this would be subject to separate assessment and applications.
Marine Mammal Mitigation Protocol (MMMP) (UXO clearance specific)	In consultation with NRW(A) and JNCC, a MMMP will be developed and subject to a separate Licence application should UXO clearance be required. As a minimum this will adhere to JNCC (2010b) guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives, and the BEIS Marine Environment: unexploded ordnance clearance joint interim position statement (2021) (A draft MMMP is provided in Appendix 4A: Outline Construction Environmental Management Plan).
Project Design - Minimal piling	The Applicant has committed to Piling only at one location at a time to reduce potential impacts to marine mammal receptors.
Project Design - Reduced Array Area	Reducing the extent of the Array Area helps to minimise displacement and barrier effects by presenting a smaller WTG area for birds to avoid or fly around.

Embedded Mitigation Measures	Description
Project Design - piling	Should impact piling be required, this will include soft-start and ramp up procedures in line with guidance (JNCC, 2010c).
Marine Mammal Mitigation Protocol (MMMP) (Piling specific)	In consultation with NRW (A) and JNCC, a MMMP will be developed and implemented and secured as a condition of the Marine Licence (A draft MMMP is provided in Appendix 4A: Outline Construction Environmental Management Plan). As a minimum, this will adhere to JNCC (2010c) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise.
Nacelle, tower, and rotor design	The nacelle, tower, and rotor will be designed and constructed in order to contain leaks thereby reducing the risk of spillage into the marine environment.
Project Design – turbine transport	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). A check of towing calculations, condition and specification of the towing equipment, emergency procedure will be carried out 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 5m in height).
Micrositing of Wind Turbine Generators (WTGs) and associated offshore infrastructure including cable routes.	The final proposed Project layout will be presented within the Design Project Array Layout Plan (PLP), which is anticipated to form conditions of the Section 36 and/or Marine Licence consent. As part of the pre-construction survey (which will be agreed upon with NRW) data will be analysed to ascertain the locations of the WTGs and cable routes, with the potential for micro-siting of the proposed Project infrastructure. Where possible, the offshore export cable route(s) will aim to avoid more sensitive habitats and where this is not possible, the route should take the shortest distance possible through the sensitive areas
Micrositing to avoid sensitive ecological receptors	Micro-siting of export cable within the corridor to help to avoid any sensitive ecological receptors in the Zone of Influence (ZoI).
Use of Horizontal Directional Drilling (HDD) as the landfall cable installation option	The Applicant has confirmed HDD as the selected installation method at landfall. HDD reduces potential effects on coastal morphology and impacts on features within the Pembrokeshire Marine SAC
Drilling fluid – to be suitably selected to minimise environmental damage. Drilling fluid will be benign and will be PLONOR.	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.

Embedded Mitigation Measures	Description
	An environmental benign drill fluid such as bentonite will be used.
Excavation techniques and 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.
Local disposal of dredged material	All material that is dredged from the seabed will be disposed of close to the dredge location to ensure material is retained within the local sediment transport system.
Pollution Prevention and Emergency Incident Response Plan	Construction practices will incorporate measures to prevent pollution. All construction work will be undertaken in accordance with a Pollution Prevention and Emergency Incident Response Plan.
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.
Vessels will operate with dynamic positioning	Where possible, vessels will operate with dynamic positioning to minimise anchor disturbance on the seabed.
Adherence with the international Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the 'BWM Convention')	Ballast water discharges from vessels will be managed under the BWM Convention which aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the discharge of ballast water with the potential to impact water quality during all proposed Project stages. Further information is presented in Volume 6, Appendix 04A, section 4.4.4.

Embedded Mitigation Measures	Description
Adherence with the International Convention for the Prevention of Pollution from Ships (MARPOL)	All vessels will operate in adherence with Marine Pollution (MARPOL) requirements. Accordance with this will help to ensure that the potential for release of pollutants is minimised during operation and maintenance. Further information is presented in Volume 6, Appendix 04A, section 4.4. This will include shipboard oil pollution emergency plans (SOPEP).
Best practice vessel handling protocols	Best practice vessel handling protocols will be adopted to minimise the potential for any impact on marine wildlife, including marine mammal receptors. For example, the Codes of Conduct provided by the WiSe Scheme, Scottish Marine Wildlife Watching Code and / or Best Practice for Watching Marine Wildlife will be adopted, as to be discussed and agreed with NRW (A) and JNCC. These will be set out within a Vessel Management Plan.
The use of guard vessels and Offshore Fisheries Liaison Officers, where required	The appointment of guard vessels and Offshore Fisheries Liaison Officers (FLO) during construction, major maintenance works and decommissioning works, where required, ensures effective communication with the fishing community during the Offshore Development Area activities and reduces the potential for interactions with fishing activities. Where possible, guard vessels will be sourced locally.
Notice to Mariners (NtMs), Kingfisher notifications, and other navigational warnings on the location, duration, and nature of works.	The Applicant will issue NtMs, Kingfisher notifications and other navigational warnings, as required in a timely and efficient manner. This will ensure navigational safety and minimise the risk of equipment snagging through the appropriate propagation of notices to other sea users.
Marine coordination for project vessels	Marine coordination for project vessels – Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods.
The International Regulations for the Prevention of Collision at Sea (COLREGs) and the International Regulations for the Safety of Life at Sea (SOLAS	All vessels will comply with the relevant COLREGS and SOLAS provisions to ensure navigational safety and minimise the risk of equipment snagging. This will include the display of appropriate lights and shapes, such as when vessels are restricted in their ability to manoeuvre.
Marine Navigation	Navigational lighting will be used on the floating platforms including yellow flashing marine lanterns. Fog lighting visible from a range of at least 2 nm
Fisheries Liaison Officer (FLO)	A FLO will be appointed to establish effective communications surrounding the proposed Project with local fishermen and other sea users. The FLO will distribute information on the safe operations of fishing activities within the Array Area and will be a contact for fishermen and other sea users during the life cycle of the

Embedded Mitigation Measures	Description
	proposed Project. The specific roles and responsibilities will be defined within the Fisheries Liaison and Co-existence Plan (FLCP) (Volume 6, Appendix 4A, section 4.4.5).
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.
Procedures for dropped objects and claim processes for loss/damage to fishing gear/vessels	The FLCP will include protocols and procedures for dropped objects to minimise the risk of equipment snagging on large, dropped objects associated with the Offshore Development Area.
Cable burial	Cable burial as the preferred means of cable protection (where practicable) to minimise the requirement for surface laid protection.
Burial Depth	The target depth of burial will be 1 m (dependent on ground conditions) and minimum depth of cover will be 0.9 m.
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 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.
Minimum depth of burial	Static cables will be buried to a target depth of 1.2m (a minimum depth of 0.8m). Where this cannot be achieved, cable protection will be applied. This will provide some separation between the cables and benthic ecology receptors, therefore reducing the effect of Electromagnetic Fields (EMF). The exact minimum cable burial depths along the OfECC will be informed by a Cable Burial Risk Assessment (CBRA) and implemented through the PLP produced post-consent.
Cable Protection	Cable protection to reduce seabed scouring will be used if deemed a requirement following a risk-based analysis to prevent the potential exposure or disturbance of marine historic environment assets that may lie unidentified below the surface of the seabed. Requirements would be informed by a CBRA and implemented through the PLP produced post-consent.

Embedded Mitigation Measures	Description
Rock placement will only be used where necessary.	Rock placement will be used sparingly. This will aid in avoiding the placement of rocks in habitats which otherwise consist of soft, sandy sediments, and will reduce the amount of permanent habitat loss. This will aid in avoiding the placement of rocks in habitats which otherwise consist of soft, sandy sediments, and will reduce the amount of permanent habitat loss.
Biosecurity and Invasive Non-Native Species (INNS) Method Statement	All construction work will be undertaken in accordance with an INNS Management Plan. An Outline INNS plan has been prepared (Appendix 04B: Outline INNS Plan)
Minimum number of WTGs	The Applicant has reduced the number of WTGs from 14 to 10 and the overall Array Area by 11% from that proposed during the scoping phase to reduce the spatial extent of potential impacts as far as practicable. In addition, the OfECC has been reduced in area, and refined particularly nearshore and at landfall, to refine the design and align with the selected landfall location at Freshwater West. In addition, the alternative landfall location to the south of West Angle Bay was removed following review of technical, engineering and environmental constraints and the selection of Freshwater West as the most appropriate landfall location.
Set wind speed range for operating turbines	The proposed wind turbines will operate within a set wind speed range, having both a minimum wind speed at which they start generating electricity, and a maximum wind speed at which turbines cannot generate and operate instead in a standby mode.
Distance between turbines	The minimum distance between turbines (centre to centre) will be 1000 m.
Removal of debris from floating lines and cables	The accumulation of marine debris on floating lines and cables has the potential to generate adverse interactions between mobile marine species and project infrastructure. Derelict fishing gears are of particular concern due to the entanglement risk they introduce to marine megafauna, including marina mammals and basking sharks. Mooring lines and floating inter-array cables will be inspected during the operation and maintenance phase using a risk-based adaptive management approach. Mooring line and cable inspections are

Embedded Mitigation Measures	Description
	expected to occur at a higher frequency initially and then reduce in frequency over a number of years, with changes to inspection periods based on evidence of risk garnered from the inspections. Any inspected or detected debris on the floating lines and cables will be recovered, based on a risk assessment which considers the impact on the environment, risk to asset integrity, and cost of intervention.
Emergency Preparedness Plan	Prior to the commencement of operation of the proposed Project, an Emergency Preparedness Plan would be prepared to cover the actions to be taken in an emergency. The plan would outline the relevant scenarios in which it would apply and would set out the actions to be taken by Floventis to minimise any environmental consequences.
Decommissioning Environmental Management Plan (DEMP)	A DEMP will be developed prior to decommissioning. The development and agreement of a decommissioning programme will ensure that the process of decommissioning the proposed Project minimises effects on commercial fisheries.
Decommissioning	A decommissioning Plan will be agreed with NRW at the relevant time prior to the start of offshore decommissioning.

20.2 Legislative Framework

8. Under Section 126 of the MCAA (2009), duties are placed on NRW Marine Licensing Team in relation to making decisions regarding marine licensing and the consideration of MCZs in Wales.

9. As part of the current marine licence decision-making process, NRW Marine Licence Team advise on developments where:

> *'… the act is capable of affecting (other than insignificantly)—*
>
> *the protected features of an MCZ;*
>
> *any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.'*

10. The MCZ Assessment process considers the potential risk for adverse effects associated with the Project which may affect MCZ protected features. This process has three sequential stages:

- Screening;
- Stage 1 Assessment; and
- Stage 2 Assessment.

20.2.1. Assessment Methodology

11. There is no specific NRW guidance on the delivery of a MCZ Assessment. Accordingly, the following methodology is based on guidance produced by the Marine Management Organisation (MMO) for the completion of MCZ Assessments within English waters (MMO, 2013). This guidance describes how MCZ Assessments could be undertaken during the process of marine licence decision-making.

Screening

12. The screening stage is the determination of whether Section 126 of MCAA (2009) applies. This considers whether:

- The licensable activity is taking place within or near an area designated as an MCZ; and
- The activity is capable of affecting (other than insignificantly) either;
  - The protected features of an MCZ; or
  - Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

13. When considering the geographical proximity of the proposed Project to the MCZ, and the potential for proposed activities to affect the designated features of an MCZ or the ecological / geomorphological processes upon which designated features are reliant; a risk-based approach is recommended by the MMO. The application of appropriate buffer zones to the protected features of an MCZ under consideration, as well as consideration of the potential risk of impacts from activities at greater distances from the MCZ is necessary.

14. Where it has been determined, through screening, that Section 126 should apply to the licence or application, NRW will assess the application further to determine which subsections of

Section 126 should apply to the application. This will be done in two stages: Stage 1 Assessment and Stage 2 Assessment.

15. If the screening stage determines that Section 126 does apply, it is necessary to assess which elements of Section 126 should apply to a marine licence application.

Stage 1 Assessment

16. The Stage 1 Assessment considers the 'likelihood of an activity causing an effect, the magnitude of the effect should it occur, and the potential risk any such effect may cause on either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant' (MMO, 2013). This should be considered in terms of whether they hinder the achievement of conservation objectives or maintenance or achievement of favourable status. If mitigation to reduce identified impacts cannot be secured, and there are no other alternative locations, then the project will proceed to be considered under Stage 2 of the assessment process.

Stage 2 Assessment

17. The Stage 2 Assessment considers whether the benefit to the public of the proposed Project outweighs the risk of damage to the environment. There are two parts to the Stage 2 Assessment process:

- Does the public benefit in proceeding with the project clearly outweigh the risk of damage to the environment that will be created by proceeding with it? If so,
- Can the applicant satisfy that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit for the damage the project will have on the MCZ features?

20.3 Purpose of this Report

18. This report presents the screening and Stage 1 phases of the MCZ Assessment process (**Figure 20-2**).
19. Where there is credible evidence that there is no risk that Project activities are 'likely to have a significant risk' (LSR) on designated features of a MCZ site, by undermining its conservation objective(s), these features have been screened out and are not taken forward for further assessment beyond Stage 1. Where such determination has been concluded, the justification is noted within the relevant receptor chapter.
20. If a credible receptor-impact pathway is identified, or there is reasonable doubt whether the Project will or will not result in LSR, in view of the conservation objective(s), then the respective site and feature is screened in for LSR and is taken forward to a Stage 2 assessment.

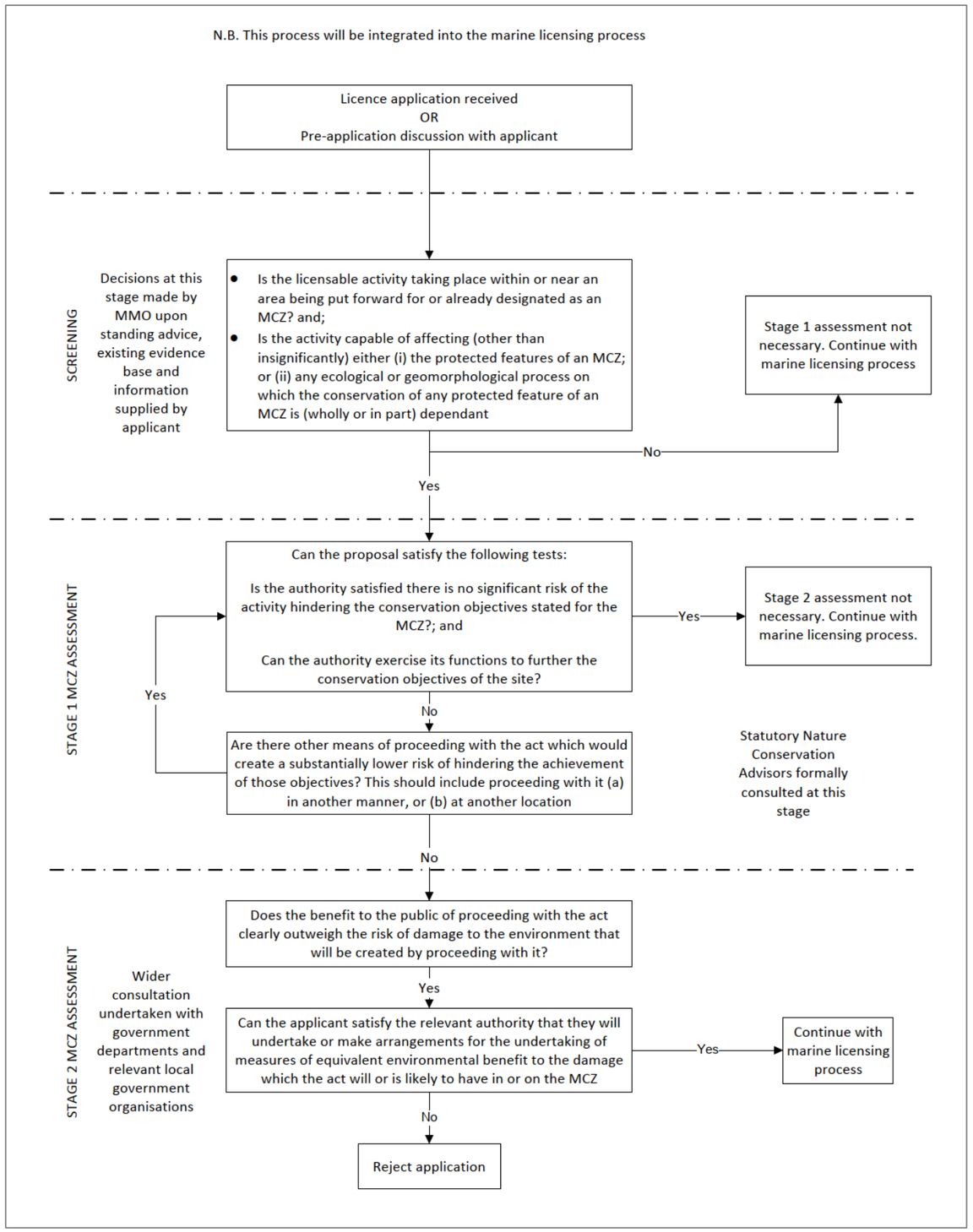

Figure 20-2. Summary of the MCZ Assessment process used by the MMO in marine licence decision making

20.4 Screening

21. The screening stage will consist of the identification of potential impacts pathways associated with the Project and the identification of any MCZs that may be affected by the Project activities, before determining where Section 126 of MCAA (2009) applies, and what sites are screened into the Stage 1 Assessment.

20.4.1 Potential Impact Pathways And Zones Of Influence (ZoI)

22. The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Intersessional Correspondence Group on Cumulative Effects pressure list and the Marine Life Information Network (MarLIN) Marine Evidence-based Sensitivity Assessments (MarESA) have been used to describe the potential impacts expected from the proposed Project.
23. The impact pathways and associated ZoIs (the extent of the potential impact from the activity) considered within this assessment are those that specifically relate to these receptors. A summary of impact pathways and associated ZoIs are presented in **Table 20-2**.

Table 20-2. Potential impact pathways from the proposed Project and their associated ZoI that could affect designated habitats and species

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
Construction	Temporary physical disturbance to habitats and species	Benthic habitats and species	Several activities occurring within the Offshore Development Area during the construction phase may cause temporary loss and / or physical disturbance to the seabed habitats and benthic species including: • HDD breakout point for 2 bores (total footprint of 100 m^2); • Sandwave levelling for a total length of 10,351 km and width of 30 m (total disturbance of 621,048 m^2 for two cables); • Disturbance swathe of 25 m for construction of two cables, including clearance activities such as pre-grapnel run and boulder clearance over 49 km total length (total footprint 2,450,000 m^2); and • If burial is possible, the entire distance of the IACs in contact with the seabed of 17.6 km would be disturbed in a swathe of up to 25 m during burial (total footprint of 440,000 m^2). Therefore, the impact pathway is expected to be limited to the Offshore Development Area.	Localised to the Offshore Development Area
	Temporary increase in suspended sediment concentration (SSC) and sediment deposition leading to contaminant mobilisation, turbidity, and smothering effects	Benthic habitats and species Fish and shellfish	Construction activities have the potential to increase SSCs creating a plume within the water column. Increased SSC can lead to reduced feeding efficiency and subsequent growth rates of filter feeders if clogging of feeding structures occurs and reduce primary production in seaweed and algae as photosynthesis is reduced. An increase in SSC may also clog gills and respiratory apparatus of fish and shellfish, and decreased visibility may reduce feeding success of visual predators. Moreover, any contaminants, such as heavy metals and toxins, within the SSC, can also be released into the water column and may alter marine water quality with subsequent indirect effects on species. Increased deposition can smother the seabed potentially resulting in changes to seabed geomorphology, sediment structure and habitats. This could have an impact on species that currently rely on these habitats, including benthic species, as well as fish species that utilise benthos for food, refuge, and	14 km from the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			spawning / nursery grounds (Ellis, et al., 2012). Therefore, increased deposition can lead to potential indirect effects on survival, growth, reproduction, and displacement of individuals. The tidal excursion distance during a mean spring tide is approximately 6 – 8 km in the Array Area, 8 - 10 km in the middle of the OfECC and 14 km in the nearshore on approach to the landfall (**Chapter 18: Physical Environment**). Therefore, the greatest tidal excursion distance of 14 km is considered to represent the maximum ZoI. Beyond this distance, there is no expected impact or change to SSC nor a measurable sediment deposition and no measurable thickness of deposition. Any impacts will be temporary with all impacts being negligible after 24 to 48 hours following cessation of activities (**Chapter 18: Physical Environment**).	
	Impact of changes to marine water quality from the use of horizontal directional drilling (HDD) drilling fluids	Benthic habitats and species Fish and shellfish Marine mammals	The use of HDD could lead to a spill of drilling fluids at the breakout location at the landfall has the potential to alter marine water quality and negatively affect receptors in the surrounding habitat. However, all drilling fluids used, such as bentonite, will be selected from the OSPAR List of Substances / Preparations Used and Discharged Offshore (2019) which are considered to Pose Little or No Risk to the Environment (PLONOR). It has been estimated that up to 1,700 m^3 of drilling mud will be generated total for the two HDD locations. Constituents of the drilling fluids, including silt-clay sized particles such as bentonite have a maximum theoretical range of approximately 14 km, which is the tidal excursion on a mean tide in the nearshore area around the landfall and outside Milford Haven. However, the volume of the discharged drilling fluid is very small and is expected to subject to immediate dilution processes and rapid dispersal over this distance which will result in no detectable change from the baseline beyond 500 m.	500 m from the HDD breakout
	Impact of changes to marine water quality	Benthic habitats	Up to 17 vessels may be required for the construction of the proposed Project. The accidental release of pollutants and planned release of	Localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
	from accidental leaks and spills from vessels, including loss of fuel oils	and species	wastewater could occur from any of the vessels associated with the proposed Project activities and any support vessels present and has the potential to alter water quality. Vessels involved in Construction Phase activities could have cleaning fluids, oils, and hydraulic fluids onboard, which could be accidentally discharged, releasing hydrocarbons and chemical pollutants into the surrounding seawater, with consequences for migratory fish. To ensure the risk of accidental spills is as low as reasonably practicable, the proposed Project will adhere to relevant guidance and embedded mitigation (**Chapter 04: Description of the Proposed Project**; **Section 20.1.2**). For example, a Construction Environmental Management Plan (CEMP) (**Appendix 04A: Outline CEMP**) including an Emergency Spill Response Plan and Waste Management Plan will be implemented during the construction phase of the proposed Project to minimise releases Appropriate Health, Safety, and Environment procedures will also be implemented, with strict weather and personnel limits to reduce any risk of accidental spillage. Furthermore, preparedness and swift response is essential for effective spill management and as such, response plans will be in place should an incident occur. Control measures and SOPEP will be in place and adhered to under International MARPOL Annex I requirements for all vessels. Planned effluent dischargers will be compliant with MARPOL Annex IV 'Prevention of Pollution from Ships' standards. All effluent will be discharged in accordance with the applicable MARPOL Annex IV 'Prevention of Pollution from Ships' standards, and therefore significance of waste discharges to fish and shellfish receptors is predicted to be negligible. Thus, the risk of an accidental spill occurring is very low and should an accidental spill or leak occur, it would be very small in extent and subject to immediate dilution and rapid dispersal within the marine environment.	
		Fish and shellfish		
		Marine mammals		

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			With these 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 to the Offshore Development Area 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.	
	Underwater noise and vibration	Benthic habitats and species Fish and shellfish Marine mammals	The sound characteristics of the proposed Project construction activities have been determined, with sub bottom profiling (SBP) and impact piling determined to have the highest sound pressure level (**Appendix 21B: 'Marine Mammals Noise Modelling'**). SBPs will be used to undertake geophysical surveys of the seabed to determine seabed structure, water depth, the presence of any obstructions and to track the location of ROVs within the OfECC, and impact piling will be required to anchor the floating WTGs to the seabed, using pin-piles to attach the anchor chains within the Array Area. There has been very little research into the impact of underwater noise on marine invertebrates. At present there are no published sensitivity thresholds for this receptor group. However, effects on invertebrates have been recorded in some studies such as Solan *et al.* (2016) where a number of species tested, including the crustacean (*Nephrops norvegicus)* and the bivalve (*Ruditapes philippinarum)*, demonstrated behavioural responses to impact pile driving sound source levels in a controlled laboratory environment. In other laboratory experiments, Wale *et al.* (2013) found some evidence for a stress response in green shore crab (*Carcinus maenas*) subject to ship playback sound, particularly in larger individuals. However, repeated exposure responses indicated that the crabs habituated or become tolerant to it. Therefore, there is currently very limited evidence to suggest that the type and duration of underwater noise that will be generated by the proposed Project will have any effect on benthic communities , and thus a localised ZoI has been defined.	Localised to the Offshore Development Area for benthic receptors For fish (327 m from the OfECC, 30.70 km from the Array Area, and 1,596 m from UXO detonation) For marine mammals (5.00 km from the OfECC, 9.27 km from the Array Area, and 5.1 km from UXO detonation)

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			Fish use sound for communication, prey location and predator avoidance, and thus it is an important environmental cue (Fay & Popper, 2000). Fish ears and the lateral line perceive underwater noise through sensitivity to vibrations. Swim bladders, which are gas-filled sacs, are also used for sound detection in some teleost or bony fish (Hawkins, 1993). Based on assessments completed in **Chapter 20: Fish and Shellfish Ecology**, the maximum distance over which SBP is predicted to result in behavioural disturbance was predicted within a maximum distance of 327 m. In terms of impact piling, low level behavioural disturbance could occur within a maximum distance of 30.7 km. Thus, a highly precautionary ZoI of 30.70 km has been defined for fish. Furthermore, underwater noise has the potential to affect marine mammals through injury, by causing physiological damage to the individuals' auditory or other internal organs, and temporary or continuous disturbance, which includes disruption to behavioural patterns such as migration, nursing, breeding, foraging, socialising and / or sheltering (JNCC, Natural England and Countryside Council for Wales, 2010). Several mitigation measures have been embedded into the proposed Project (**Section20.1.2**), including implementation of a MMMP. The precautionary distance from sound source at which disturbance by SBP can occur, referred to as the effective deterrent range (EDR) is 5 km (JNCC, 2020). Moreover, in terms of impact piling, based on **Appendix 21B: Marine Mammals Noise Assessment**, any disturbance effects will occur within a maximum range of 9.27 km. Thus, a precautionary ZoI of 9.27 km has been defined for marine mammals. Unexploded Ordinance (UXO) have the potential to physically harm (possibly fatally) fish and marine mammals within the blast radius or resulting pressure wave. An explosion could also pose risk similar to that of underwater noise to receptors. Underwater noise impacts from UXO detonation are excluded from the assessment as the pre-construction determination of the presence of UXO will not be undertaken until a later	

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			stage of the proposed Project. Should UXO be found, and detonation required this will be subject to a separate application for consent. Assessments completed in **Chapter 20: Fish and Shellfish Ecology** were based on the unrealistic worst case scenario (high-order; using charge weight of 794 kg), and determined that mortality or injury from UXO detonation could occur within a maximum distance of 1,019 m for all hearing sensitivity fish species, reducing to 596 m for the realistic low-order scenario. Any behavioural disturbance will also be highly localised to within intermediate distances (i.e. hundreds of metres) (Popper, et al., 2014) and very short in duration with fish can return to the area following detonation. For marine mammals, the range of disturbance risk for the unrealistic worst case scenario was found to be a maximum 155 km for very high frequency cetaceans, which reduces to 5.1 km for the realistic low-order scenario. However, it is not expected that UXO clearance events would result in any significant disturbance risk to marine mammals as any impact is likely to be of very short term with full rapid recovery to normal behaviour.	
	Introduction and spread of INNS via vessel hull or ballast water	Benthic habitats and species	The accidental introduction of INNS, such as from international vessels ballast water or through the installation of additional of substrate onto the seabed such as mechanical protection, has the potential to cause detrimental changes to benthic habitats. Whilst most non-native species are unlikely to become invasive, those that do can out-compete native species and introduce diseases which could result in significant changes to community composition and mortality. The introduction of INNS could occur from the different vessels that may be required during the construction phase of the proposed Project. The effect on benthic habitats if INNS were to be introduced by Project vessels could be long-term. For this reason, all Project vessels will adhere to the BWM Convention with the aim of preventing the spread of INNS (IMO, 2017). In addition, vessels will be required to adhere to the International Maritime Organisation (IMO) guidelines for the control and management of	Localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			ships' biofouling to minimise the transfer of invasive aquatic species. These measures lower the probability of INNS transmission from vessels to the benthic habitat. The Great Britain INNS Strategy also provides guidance for the prevention, detection, eradication, and management of INNS, including marine species. Best practice measures will be adopted, in particular, compliance with the relevant IMO guidance regarding ballast water and biofouling, which will be implemented through the CEMP and INNS plan (**Appendix 04B: INNS Plan**). These measures will reduce the overall risk of introduction of INNS. The ZoI is anticipated to be localised to the Offshore Development Area.	
	Collision with Project vessels	Marine mammals	During the construction, operation and maintenance, and decommissioning phases there will be an increase in vessel activity, compared to baseline levels, which may increase the risk of vessel collisions with marine mammals. Although the consequences of vessel collision with marine mammals can result in lethal and sub-lethal injury, the risk of occurrence is very low and is expected to be highly localised to the proposed Project area. As such, across the works duration, if any individuals are affected over the Project lifetime the number is expected to be very small. Marine mammals features may experience disturbance or displacement from construction activities. This may cause avoidance behaviours of the area. The exact response of mobile protected features to disturbance is still not fully understood, however, as the vessels are anticipated to be moving, their impact ZoI will be transitory. Moreover, a MMMP has been developed (**Section 20.1.2**), and this impact is considered temporary as once the vessel has moved away, normal activity can resume.	Localised to the Offshore Development Area
	Potential for indirect effects through impacts upon prey species	Marine mammals	There is potential for changes in the abundance and distribution of prey from activities which change or disturb the seabed which could affect prey availability (JNCC, 2018; Santos & Pierce, 2003). The potential impacts on prey species are considered to be very low and is expected to be highly	Localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			localised to the proposed Project area, therefore representing a very small proportion of the foraging range of marine mammals.	
	Airborne sound and visual disturbance (pinnipeds only)	Marine mammals	Air-borne sound and visual disturbance from vessels and cable installation has the potential to affect seals hauled out along the coastline (Eden, et al., 2010). There is no standard distance at which seals may react negatively to disturbance. However, Marine Scotland guidance (2014) recommends a precautionary distance of 20 km. Therefore, a ZoI of 20 km has been defined.	20 km from the the Offshore Development Area
Operation and maintenance	Permanent direct loss of and physical disturbance to habitats and species	Benthic habitats and species	The placement of hard substrates on the seafloor, including cable and scour protection, can result in the permanent loss of habitats and species. Sensitivity to physical disturbance varies between receptor; for mobile receptors such as fish and crustaceans, displacement may occur, whilst sedentary or less mobile receptors such as shellfish and sessile species, may experience physiological / morphological damage and / or mortality. Sources of permanent habitat loss associated with the proposed Project consist of: • 50 m^2 of protection, such as rock placement and/or concrete mattresses, per bore at HDD exit point (total footprint of 100 m^2); • Cable protection (excluding crossings) in OfECC over a total distance of 1,600 m per cable, with a worst-case scenario berm width of 5 m (total footprint of 16,000 m^2 for two cables); • Four cable crossings each requiring protection (none required for Greenlink) of 200 m length and 5 m width (footprint of 8,000 m^2 for two cables); • 11,000 m of articulated piping, 500 mm in diameter per export cable (total footprint of 11,000 m^2 for both cables); • Assuming a worst-case scenario of 20% cable protection of the 17,600 m of IAC, with a berm width of 5 m, the total area of cable protection would be 17,600 m^2; • Potential placement of anchor scour protection (total footprint 24,800 m^2), placement of clump weights (total footprint 8,000 m^2), and drag	Localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			embedment anchor or drilled pile anchors (total footprint of 6,120 m^2); and • Subsea connector of 64 m^2. Therefore, the resultant loss of habitat is expected to be limited to the Offshore Development Area footprint.	
	Temporary increase in SSC and sediment deposition associated with maintenance activities leading to contaminant mobilisation, turbidity and smothering effects	Benthic habitats and species Fish and shellfish	During cable repairs and / or the remedial reburial of exposed cables that may be required during the operational lifetime of the proposed Project, there is the potential for small, localised, temporary increases in SSC to occur throughout the Offshore Development Area, which could lead to the remobilisation of contaminants and increases in turbidity and smothering. During the lifetime of the proposed Project, up to five cable repairs are expected and it is anticipated that the duration and extent of repair would be a small fraction of that proposed for the construction phase. This can be project-specific due to differing sea conditions and materials used. However, it is anticipated that during any required repairs or reburial, equipment similar to that used in the Construction Phase will be used. Due to the expected shorter period of time over which repairs would take place compared to the Construction activities, any local increases in SSC and therefore contaminants, turbidity and smothering will be no greater than that associated with Construction, thus a ZoI of 14 km is identified.	14 km from the Offshore Development Area
	Alteration and / or indirect loss of habitat during the operational lifetime of the proposed Project	Benthic habitats and species	Several activities which involve the introduction of new infrastructure as part of the proposed Project could result in the alteration and / or loss of habitat during its operational lifetime, by facilitating the growth of new biological communities and / or changing the morphology of the seabed. These include: • The placement of mechanical cable protection in the OfECC which would be left in place for the operation and maintenance phase (35,000 m^2 total protection for 2 cables in the OfECC); and	Localised to Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			• The placement of cable and scour protection on IACs and associated mooring / anchoring systems and subsea connector (total footprint of 55,784 m^2). Such infrastructure results in the introduction of new, hard substrate into areas of seabed which may otherwise consist of soft sediments. The ZoI is therefore understood to be localised to the Offshore Development Area.	
	Changes to habitats due to on-going scour, changes in hydrodynamics, increased sedimentation and smothering, and abrasions, from the movement of mooring chains	Benthic habitats and species	The mooring chains on the seabed throughout the Array Area can lead to on-going scour, changes in hydrodynamics, increased sedimentation and smothering, and abrasions, throughout the operation and maintenance phase. This can lead to changes in habitat. Total area of mooring line disturbance in the Array Area is therefore 5,600 m. Therefore, the impact is anticipated to have a highly localised ZoI.	Localised to Offshore Development Area
	Disturbance to benthic habitats during planned maintenance and instances of cable failure and excavation	Benthic habitats and species	Maintenance and cable repair activities during instances of cable failure and excavation, where required, will be carried out using the same or similar methods as the Construction Phase activities, and therefore the potential pathways for impacts to benthic ecology are expected to be the same as those identified for the Construction Phase of the proposed Project. The worst-case scenario has assumed up to five cable repairs will to be required over the lifetime of the proposed Project. Repair 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 lower magnitude and duration as the construction phase.	Highly localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
	Increase in thermal emissions from cable operation	Benthic habitats and species Fish and shellfish	Operation of electricity cables generates heat due to resistance in the conductor components, which can warm the cable surface and adjacent environment (i.e. sediments; Meissner *et al.* (2008)). Temperature increases near the cable can modify chemical and physical properties of the substrate, such as oxygen concentration, microorganism communities, and / or bacterial activity. Physiological changes in macrobenthic organisms living at the water-sediment interface and in the top sediment layers can also potentially occur. Submarine power cables have been shown to generate and dissipate heat when active, with some reaching cable surface temperatures of up to 70°C (Emeana, et al., 2016). Temperatures such as these have the potential to cause sediment dwelling and for demersal mobile organisms to move away from the affected area. Increased heat could also alter the physico-chemical conditions and bacterial activity in surrounding sediments, which may result in alterations to faunal composition and localised ecological shifts (Meissner *et al.* 2008).The full effects of temperature changes on sediment composition and related biogeochemical cycling are unknown. However, preliminary studies which have been conducted have indicated that increased temperatures could cause shifts in the community composition of bacteria (Hicks, et al., 2018). Sediment particle size composition has been found to influence heat transfer, with coarse silts experiencing the greatest temperature change, but to a shorter distance from the source, while fine and coarse sands had a lower temperature change but a greater affected distance (Emeana, et al., 2016). For unburied and dynamic cables any temperature increase will be rapidly attenuated in water. The temperature associated with buried cables decreases with distance from the cable. Therefore, if a minimum burial of 0.8 m is reached, any increase at the sediment surface or in shallow sediment depths at which infaunal species	Localised to cable locations within the Offshore Development Area, dependent upon the heat carrying capacity of particular sediments

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			are typically found is expected to be small and likely to be only a few degrees higher than ambient temperature. The latest OSPAR report states these indicate that for currently used power cables, the threshold of 2°C temperature increase at a sediment depth of 20 cm will only be exceeded in rare cases and for short periods of time (OSPAR, 2023). If the burial depth is decreased to a minimum depth of 0.8 m, then any further changes to temperature are also considered to be highly localised to the Offshore Development Area, with any increase in temperature decreasing rapidly with distance from the cable and within 30 cm of the sediment surface	
	Effects of EMF emissions	Benthic habitats and species Fish and shellfish Marine mammals	Subsea cables associated with offshore wind farms are known to produce EMF emissions (Hutchison, *et al.,* 2020) and have the potential to affect the foraging and migratory success and behaviour of species. The design of the proposed Project includes up to two electricity export cables transmitting electricity from the wind turbines to the shore over a distance of 49 km. The export cables will be within separate trenches 10 m apart with a target depth of 1.2 m, and minimum burial depth of 0.8 m. In addition, there will be inter-array cables linking the turbines with a total length of 17.10 km. EMF will be emitted from the export cables and the IACs for the duration of the operational life of the proposed Project. Findings from the project-specific EMF assessment (**Appendix 19C: EMF Assessment**) found that the maximum EMF strength predicted to result from the operation of the export cables target cable burial depth of 1.2 m, when a receptor is 0 m from the seabed, is 2.6 µT (microtesla). The effects of EMF reduce with distance from the cable, and the modelling shows negligible emissions beyond 2 m distance from the cable for 1.2 m target burial depth. if the burial depth is reduced to 0.8 m, any changes in EMF emissions are considered to be negligible and similar in effect to that provided in the modelling. For dynamic exposed cables in the water column, such as those within the Array Area, the maximum EMF strength at the surface of the cables has been	Localised to a few metres of the cable locations within the Offshore Development Area (+2 m buffer)

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			calculated as ~5.2 mT. This is significantly higher than the background level of geomagnetic field in the UK, which is around 50 µT but this also decreases rapidly with distance from the cable. At a distance of 0.44 m from the cable surface EMF is approximately equal to background levels (**Appendix 19C: EMF Assessment**). There is evidence that some benthic invertebrates are able to detect EMF. For example, in laboratory test conditions the brown crab (*Cancer pagurus)* showed a clear attraction to EMF and reduced their time spent roaming (Scott, et al., 2018). However, the test used an EMF strength of 2.8 mT (millitesla) which is higher than that produced by active subsea High-Voltage Direct Current (HVDC) cables. Scientific experiments around an active cable in Puget Sound found the cable had no impact on crab behaviour, including when they were moving across the cable (Love, et al., 2017). Other studies also indicate that invertebrates do not have a notable sensitivity to EMF. EMF emissions from subsea cables have the potential to affect the foraging and migratory success and behaviour of migratory fish. Furthermore, marine mammals may be able to detect variations in magnetic fields and may utilise the Earth's magnetic field for navigation (Normandeau, et al., 2011). Therefore, there is potential for EMF emitted from the inter-array and export cables to interfere with marine mammal behaviour. It is considered that any effects from EMF would be highly localised around Offshore Development Area. However, as the effects of EMF were also found to reduce with distance from a cable, resulting in negligible emissions beyond a distance of 2 m, therefore a ZoI of 2 m has been identified.	
	Introduction and spread of INNS	Benthic habitats and species	There will be no further infrastructure installed on the seabed within the Offshore Development Area once the proposed Project is operational. Therefore, the most likely potential sources of INNS are considered to be from vessels carrying out maintenance or repair works.	Localised to the Offshore Development Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			The accidental introduction of INNS, such as from international vessels ballast water or through the addition of substrate in the water such as mechanical protection, has the potential to cause detrimental changes to benthic habitats. Whilst most non-native species are unlikely to become invasive, those that do can out-compete native species and introduce diseases which could result in significant changes to community composition and mortality (Bax, *et al.*, 2003). The number of vessels required during the operation and maintenance phase will be lower than during the construction phase. All Project vessels will adhere to BWM Convention with the aim of preventing the spread of INNS. In addition, vessels will be required to adhere to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines). These measures lower the probability of INNS transmission from vessels to the benthic habitat. Moreover, the Great Britain INNS Strategy also provides guidance for the prevention, detection, eradication and management of INNS, including marine species. Best practice measures will be adopted, in particular, compliance with the relevant IMO guidance regarding ballast water and biofouling, which will be implemented through the CEMP and INNS plan (**Appendix 04B: INNS Plan**). These measures will reduce the overall risk of introduction of INNS. The ZoI is anticipated to be localised to the Offshore Development Area.	
	Disturbance effects to fish (such as barrier effects, collision and entanglement) from the presence of floating offshore structures and associated tethering systems	Fish and shellfish Marine Mammals	Floating platforms and infrastructure on the seabed may act as fish aggregating devices, changing species composition and abundance at localised scales and foraging pressure for example, from seals (e.g., see Farr *et. al*., (2021)). The physical presence of infrastructure also has the potential, to present a barrier to movement and migratory pathways (Draget, 2014). Furthermore, there is a risk of entanglement arises from the introduction of mooring lines to anchor the semi-submersible platforms. Marine mammal receptors may become entangled in the mooring lines. Floating wind is a new	Localised to the Array Area

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
			technology, and as such there are no data on entanglement risk. However, entanglement incidents have not been reported for the oil and gas industry, where similar moorings are used (Benjamins, et al., 2014). By its very nature, entanglement will only occur within the footprint of the Array Area.	
	Underwater noise and vibration	Fish and shellfish Marine mammals	During operation, underwater noise can be produced from both the turbines, and from cables that may 'snap' as cable tension is released in the mooring system. Modelling of the impact of underwater noise as a result of turbine operation, including vibration from rotating machinery in the turbines, concluded that any sound produced is expected to be very low (**Appendix 21B: Marine Mammals Noise Modelling**). Moreover, cable snapping can occur when tension which has built up in the mooring lines of the floating turbines is released. This can also generate particle motion, which is known to be a key acoustic stimulus in fish (Popper, et al., 2014) could act as a barrier to the movement of diadromous fish during key migratory periods. Furthermore, underwater noise has the potential to affect marine mammals through injury, by causing physiological damage to the individuals' auditory or other internal organs, and temporary or continuous disturbance, which includes disruption to behavioural patterns such as migration, nursing, breeding, foraging, socialising and / or sheltering (JNCC, *et al.*, 2010). However, the underwater noise levels associated with the operation and maintenance activities will be operating at frequencies that are not expected to have an impact on ecology. Moreover, there is an understanding that more mobile species are able to move away from a sound source before the effects are realised. Thus, the ZoI of underwater noise is expected to be localised.	Localised to the Array Area
Decommissioning	Temporary increase in SSC and sediment deposition leading to	All receptors	At the end of the operational life of the proposed Project, there will be a decommissioning plan in place. Other proposed Project constraints will also	ZoI as above for construction phase.

Project Phase	Potential Impact Pathway	Receptor	Rationale	ZoI
	contaminant mobilisation, turbidity, and smothering effects		be taken into consideration (e.g. safety and liability), with the least environmentally damaging option chosen if possible. The full details of the proposed decommissioning will not be agreed until towards the end of the 25-year operational lifetime of the proposed Project. However, the decommissioning phase is expected to largely mirror the construction process over a period of 12 months (see **Chapter 04: Description of the Proposed Project**). Therefore, the impacts of the decommissioning stage are not expected to exceed impacts of the construction phase	
	Underwater noise and vibration			
	Collision with Project vessels			
	Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils			
	Potential for indirect effects through impacts to prey species			

20.4.2. Identification of MCZs and Screening Assessment

24. The Array Area and OfECC do not overlap with any MCZ sites. In order, to maintain a precautionary approach, sites have been considered to encompass all ZoI of impact pathways, thus, any MCZ within a 30.7 km screening distance of the proposed Project has been assessed within the screening stage.
25. However, following guidance from NRW (NRW, 2022), OSPAR Region III: Celtic Seas Marine Mammal Management Unit (MMMU), reflects the most appropriate spatial scale of grey seal movements in the region. Grey seals are understood to forage over distances up to 448 km in search of prey (Carter, et al., 2022). Therefore, any sites beyond the OSPAR Region III: Celtic Seas MMMU within this foraging distance (Carter, et al., 2022), will be reviewed for possible connectivity with the MMMU. The only MCZ within the OSPAR Region III: Celtic Seas MMMU designated for a marine mammal feature is Skomer MCZ, which is within the 30.7 km screening distance.
26. All sites assessed within the screening stage can be seen in **Figure 20-3** and **Table 20-3**.

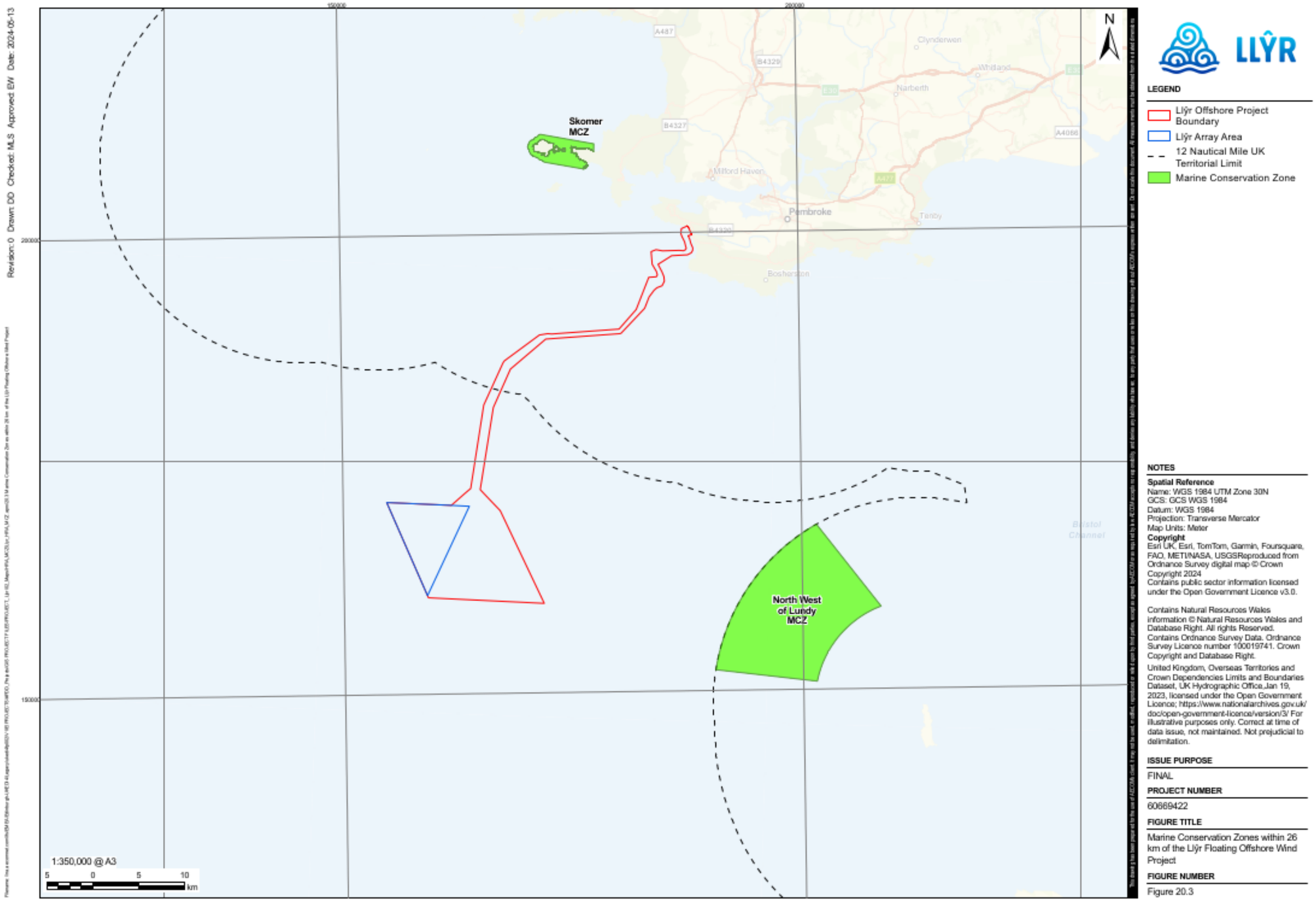

Figure 20-3. MCZs within 30.7 km of the proposed Project

Table 20-3. MCZ Screening Assessment

Site name	Protected Features	Distance to Array Area (km)	Distance to Llŷr OfECC (km)	Screening decision	Reason for screening decision
Skomer MCZ	• Grey seal *Halichoerus grypus*; • Pink seafan *Eunicella verrucose*; • Sponge communities; • Eelgrass *Zostera marina*; and • Algal communities.	38.39	11.57	**In**	There are potential impact pathways with a ZoI that overlaps with this MCZ and may adversely impact the benthic species and habitats including: • Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity, and smothering effects; and • Decommissioning effects (Temporary increase in SSC and sediment deposition). Grey seals range widely in search of prey, with a foraging range of up to 448 km (Carter, et al., 2022), and therefore, have the potential to overlap with the ZoI of all potential impact pathways associated with the proposed Project that may adversely impact marine mammal features. These include: • Changes to marine water quality from the use of HDD drilling fluids; • Underwater noise and vibration; • Collision with Project vessels; • Potential for indirect effects through impacts upon prey species; • Airborne sound visual disturbance (pinnipeds only); • Effects of EMF emissions;

Site name	Protected Features	Distance to Array Area (km)	Distance to Llŷr OfECC (km)	Screening decision	Reason for screening decision
					• Aggregation of fish and associated effects such as barrier effects, collision, and entanglement from the presence of floating offshore structures and associated tethering systems; • Underwater noise and vibration; and • Decommissioning effects. Therefore, **Skomer MCZ has been screened in for further assessment**.
North West of Lundy MCZ	• Subtidal coarse sediment.	31.05	19.84	Out	There are no potential impact pathways associated with a ZoI that overlaps with the protected features within this MCZ. Therefore, no adverse impact on the subtidal coarse sediment features is anticipated, **LSR is determined**, and the MCZ has been screened out of further assessment.

20.4.3. Screening Conclusion

27. Based on the potential impact pathways for all stages of the proposed Project (construction, operation and maintenance, and decommissioning) (**Table 20-2**), the only site screened into the next stage of the MCZ Assessment is Skomer MCZ.

20.5 Stage 1 Assessment: Skomer MCZ

28. Skomer MCZ has been screened into Stage 1 of the MCZ Assessment (**Table 20-3**). Skomer MCZ was established in 2014 and is situated around the island of Skomer and the Marloes Peninsula in Pembrokeshire, Wales. Before 2014, the area had been Wales' only Marine Nature Reserve for 24 years.

29. Skomer MCZ is approximately 11.57 km from the OfECC and 38.39 km from the Array Area. The following 5 features are protected by the Skomer MCZ:

    - Grey seal;
    - Pink seafan;
    - Sponge communities;
    - Eelgrass; and
    - Algal communities.

30. Conservation objectives are yet to be defined for the Skomer MCZ. NRW has committed to continue to manage and monitor Skomer MCZ until conservation objectives have been defined and agreed with the Welsh Government. However, the Defra MCZ Designation Explanatory Note (2013) states that '*Generally, each MCZ has one conservation objective. The objective applies to all of the features being protected. The objective is that each of the features being protected be in favourable condition*'. As such, the following assessment proceeds on the presumption that this conservation objective should be met.

20.5.1 Benthic Protected Features

31. The four benthic features of Skomer MCZ will be assessed within Stage 1 of the MCZ Assessment. Due to their sessile nature, the benthic features of Skomer MCZ are protected within the site boundary; and thus any potential impact pathways that have a ZoI that does not overlap with Skomer MCZ have been screened out of further assessment (**Table 20-2**). Therefore, the only potential impact pathway assessed for impacts on benthic habitat and species features include the temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity, and smothering effects during the construction and decommissioning phases.

Pink Seafan

32. Pink seafan is a gorgonian that can appear white to pink in colour. Seafans are made of colonies of small polyps. These colonies can grow on average around 25 cm high but can grow to sizes of 50 cm high. They are usually found on upward facing bedrock oriented at right-angles to the prevailing currents (Readman & Hiscock, 2017). The pink seafan has a generally south west distribution, as far north as Pembrokeshire and to Portland eastwards. It is common in Devon, Cornwall, the Isles of Scilly and Lundy. Gorgonians are reported to have sporadic and / or low recruitment with a highly variable growth rate (Lasker, *et al.*, 1998; Yoshioka, 1996; Coma, *et al*., 2006). Pink seafan are not sensitive to small changes in SSC, however, they are sensitive to heavy smothering and siltation rate changes (Readman & Hiscock, 2017).

Sponge Communities

33. Sponges are sessile organisms in the phylum Porifera that attach to rocky substrates in benthic habitats. The sponge communities in the Skomer MCZ have been designated due to the high species diversity. Within the MCZ, 130 sponge species have been recorded, with four species in listed on the nationally rare and scarce marine benthic species list for Great Britain. Sponges

are the simplest multi-cellular animals; able to survive in a range of environments, including low levels of SSC (Pineda, *et al*., 2016), but a high SSC may block their pores, which may affect survival by inhibiting their ability access essential nutrients and oxygen (Jones, *et al.*, 2020).

Eelgrass

34. Eelgrass are a group of angiosperms adapted to live in marine conditions. They are found throughout the UK, but their distribution is patchy and has reduced by 39 % since the 1980s (Green, *et al.*, 2021). Eelgrass are primarily found on sand to fine gravel substrate in shallow waters down to 4 m in sheltered areas such as bays, estuaries, saline lagoons and inlets. They have been seen to be able to withstand small increases in SSC over a short period of time (d'Avack, *et al.*, 2014), but have a very low recoverability and low a tolerance to high levels of smothering (Tyler-Walters, 2008).

Algal Communities

35. The algal communities within Skomer MCZ consist of a variety of different species, which are likely to have a wide range of preferred environmental conditions. The sensitivity of algal communities will be dependent on their location and individual species-specific adaptive capacities. The sensitivity and resilience and resistance will be dependent on species composition and the environment in which they are found.

20.5.2 Marine Mammal Protected Feature

36. Grey seal is a protected feature of Skomer MCZ, and this species will therefore be assessed within Stage 1 of the MCZ Assessment. Adult grey seals spend most of the year at sea and come ashore in autumn to form breeding colonies on rocky shores, beaches, caves, occasionally on sandbanks and small islands during winter (September-January). The UK population represents about 38% of the world population (SCOS, 2021).
37. Grey seals range widely in search of prey (Carter, et al., 2022), with the OSPAR Region III: Celtic Seas MMMU reflecting the most appropriate spatial scale of grey seal movements in the region. Thus, there is potential that the species will overlap with the ZoI of all potential impact pathways associated with the proposed Project that may adversely impact marine mammal features.

Table 20-4. Stage 1 Assessment for the protected features in the Skomer MCZ

Project Phase	Protected Features	Potential Impact Pathway	Rationale
Construction	• Pink seafan; • Sponge communities; • Eelgrass; and • Algal communities.	Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity, and smothering effects	The effect of increased SSC is expected to be limited to within the tidally aligned sediment plume **in Chapter 18: Physical Environment** and is expected to be limited to approximately 14 km from its source. Skomer MCZ falls within the ZoI for this impact pathway. However, at this distance, there is only expected to be a small but measurable increased in SSC, and no measurable thickness of deposition. The benthic receptors are understood to be able to withstand small changes in SSC over a short period of time (Readman & Hiscock, 2017; Pineda, *et al.*, 2016; d'Avack, *et al.*, 2014). Pink seafans, sponge communities, and eelsgrass are sensitive to sediment deposition and its smothering effects (Jones, *et al.*, 2020; Readman & Hiscock, 2017; Tyler-Walters, 2008). However, at this distance, deposition is anticipated to be negligible. Moreover, any impacts will be temporary with all impacts being negligible within 24 hours following cessation of activities. Therefore, **no LSR is determined**, and no further assessment is required for benthic features.
	• Grey seal	Changes to marine water quality from the use of HDD drilling fluids	Grey seals are known to have haul-out sites within Skomer MCZ and Skomer Island is also known to be a pupping site, and therefore, the species is regularly monitored (Büche, 2021). In 2021, the maximum number of seals hauled out was found in November, with 378 individuals recorded. However, Skomer MCZ is beyond the precautionary ZoI based on guidance from Marine Scotland (2014). Therefore, **no LSR is determined** for airborne sound and physical disturbance to hauled out grey seal features. Grey seals range widely in search of prey, with a foraging range of up to 448 km (Carter, et al., 2022), and therefore, fall within the ZoI of the potential
		Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils	
		Underwater noise and vibration	
		Collision with Project vessels	
		Potential for indirect effects through impacts to prey species	

Project Phase	Protected Features	Potential Impact Pathway	Rationale
		Airborne sound and visual disturbance (pinnipeds only)	impact pathways associated with the proposed Project (**Table 20-2**). Some of the potential impacts, including physical disturbance, pollution events, vessel collision, and impacts on prey species, are expected to be highly localised to the proposed Project area. Moreover, potential impacts of underwater noise associated with the proposed Project activities, are expected to be limited to a maximum range of 9.27 km from the Offshore Development Area. However, this range represents a very small proportion of the grey seal foraging range, thus, the associated risk is considered to be low. Seals are managed in MMMUs, which consider distinct populations. The proposed Project falls within the within the OSPAR Region III: Celtic Seas MMMU and includes Skomer MCZ as well as the Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation (SAC), which is also designated for grey seal. Therefore, the grey seals designated under Skomer MCZ are considered to be the same population as those protected by Pembrokeshire Marine SAC. This SAC is considered within the Habitats REGULATIONS Assessment (HRA) for the proposed Project (**Appendix 8D: Habitats Regulations Assessment Screening**), and the site is screened into the Appropriate Assessment (AA) stage of the HRA (**Appendix 8E: Habitats Regulations Assessment Report to Inform Appropriate Assessment)**. As such, the AA is considered adequate for assessment of potential impacts on the grey seal population within the OSPAR Region III: Celtic Seas MMMU, and therefore Skomer MCZ. For further information regarding this assessment refer to **Appendix 8D: Habitats Regulations Assessment Screening**, and **Appendix 8E: Habitats Regulations Assessment Report to Inform Appropriate Assessment**. These assessments concluded that the potential impact associated with the proposed Project will not hinder the conservation objectives of the grey seal feature, and thus there is no potential for an adverse effect on site integrity of Pembrokeshire Marine SAC. Therefore, there is **no LSR is determined** for the grey seal feature of Skomer MCZ, and no further assessment is required.

Project Phase	Protected Features	Potential Impact Pathway	Rationale
Operation and maintenance	• Pink seafan; • Sponge communities; • Eelgrass; and • Algal communities.	Temporary increase in SSC and sediment deposition associated with maintenance activities leading to contaminant mobilisation, turbidity and smothering effects	The effect of increased SSC and any disturbance during maintenance are expected to be limited to within the tidally aligned sediment plume in **Chapter 18: Physical Environment** and is expected to be limited to approximately 14 km. Skomer MCZ falls within the ZoI for this impact pathway. However, at this distance, there is only expected to be a small but measurable increased in SSC, and no measurable thickness of deposition. The benthic receptors are understood to be able to withstand small changes in SSC over a short period of time (Readman & Hiscock, 2017; Pineda, *et al.*, 2016; d'Avack, *et al.*, 2014). Pink seafans, sponge communities, and eelsgrass are sensitive to sediment deposition and its smothering effects (Jones, *et al.*, 2020; Readman & Hiscock, 2017; Tyler-Walters, 2008). However, at this distance, deposition is anticipated to be negligible. Therefore, **no LSR is determined**, and no further assessment is required for benthic features.
	• Grey seal	Effects of EMF emissions Aggregation of fish and associated effects such as barrier effects, collision, and entanglement from the presence of floating offshore structures and associated tethering systems Underwater noise and vibration	Grey seals range widely in search of prey, with a forging range of up to 448 km, and therefore, fall within the ZoI of the potential impact pathways associated with the operation and maintenance of the proposed Project (**Table 20-2**). Some of the potential impacts, including the impacts of EMF emissions, and risk of entanglement and collisions, are expected to be highly localised to the Offshore Development Area. The proposed Project activities may lead to avoidance behaviours being exhibited but the area represents a very small proportion of the grey seal foraging range and therefore, the associated effect is low. During operation, underwater noise can be produced from both the turbines, and from cables. Modelling of the impact of underwater noise as concluded that any sound produced is expected to be very low (**Appendix 21B: Marine Mammals Noise Modelling**). Moreover, there is an understanding that more mobile species are able to move away from a sound source before the effects are realised. Thus, the any impacts are expected to be localised. The grey seals designated under Skomer MCZ are considered to be the same population as those protected by Pembrokeshire Marine SAC. This SAC is

Project Phase	Protected Features	Potential Impact Pathway	Rationale
			considered within the HRA for the proposed Project (**Appendix 8D: Habitats Regulations Assessment Screening**), and the site is screened into the AA stage of the HRA (**Appendix 8E: Habitats Regulations Assessment Report to Inform Appropriate Assessment)**. As such, the AA is considered adequate for assessment of potential impacts on the grey seal population within the OSPAR Region III: Celtic Seas MMMU, and therefore Skomer MCZ. These assessments concluded that the potential impact associated with the proposed Project will not hinder the conservation objectives of the grey seal feature, and thus there is no potential for an adverse effect on site integrity of Pembrokeshire Marine SAC. Therefore, there is **no LSR is determined** for the grey seal feature of Skomer MCZ, and no further assessment is required.
Decommissioning	• Pink seafan; • Sponge communities; • Eelgrass; and • Algal communities.	Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity, and smothering effects	The removal of any infrastructure from the seabed will result in disturbance to the sediment that will temporarily increase the concentration of particles in the water column. However, the magnitude of this effect is expected to be similar or smaller than that for the construction phase. As no LSR is determined for either the construction nor operation and maintenance phase, **no LSR is determined** during the decommissioning phase, and no further assessment is required for benthic features.
	• Grey seal	Underwater noise and vibration	At the end of the operational life of the proposed Project, there will be a decommissioning plan in place. Other proposed Project constraints will also be taken into consideration (e.g. safety and liability), with the least environmentally damaging option chosen if possible. 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 construction process over a period of 12 months (see **Chapter 04: Description of the Proposed Project**). Therefore, the impacts of the decommissioning stage are not expected to exceed impacts of the construction phase.
		Collision with Project vessels	
		Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils	
		Potential for indirect effects through impacts to prey species	

Project Phase	Protected Features	Potential Impact Pathway	Rationale
			The grey seals designated under Skomer MCZ are considered to be the same population as those protected by Pembrokeshire Marine SAC. This SAC is considered within the HRA for the proposed Project (**Appendix 8D: Habitats Regulations Assessment Screening**), and the site is screened into the AA stage of the HRA (**Appendix 8E: Habitats Regulations Assessment Report to Inform Appropriate Assessment)**. As such, the AA is considered adequate for assessment of potential impacts on the grey seal population within the OSPAR Region III: Celtic Seas MMMU, and therefore Skomer MCZ. These assessments concluded that the potential impact associated with the proposed Project will not hinder the conservation objectives of the grey seal feature, and thus there is no potential for an adverse effect on site integrity of Pembrokeshire Marine SAC. Therefore, there is **no LSR is determined** for the grey seal feature of Skomer MCZ, and no further assessment is required.

20.6 Conclusion

38. Skomer MCZ was the only site that progressed through the screening stage for consideration within Stage 1 Assessment. Skomer MCZ is located 11.57 km away from the proposed Project activities, falling outside the ZoI of any potential impact pathways for benthic receptors. Therefore, it was concluded that there was **no LSR for benthic features of Skomer MCZ**.

39. Grey seal are also listed as a protected feature of the Skomer MCZ. The Skomer MCZ population is part of the same MMMU, and therefore the same distinct population is the designated grey seal populations listed for the Pembrokeshire Marine / Sir Benfro Forol SAC. As such, **the potential for adverse effects from proposed Project activities on the grey seal population within the OSPAR Region III: Celtic Seas MMMU is assessed, in detail, within the AA stage of the HRA** (**Appendix 8D: Habitats Regulations Assessment Screening**, and **Appendix 8E: Habitats Regulations Assessment Report to Inform Appropriate Assessment**). These assessments concluded that the potential impact associated with the proposed Project will not hinder the conservation objectives of the grey seal feature, and thus there is no potential for an adverse effect on site integrity of Pembrokeshire Marine SAC. Therefore, there is **no LSR is determined for the grey seal feature of Skomer MCZ**, and no further assessment is required.

20.7 References

Bax, N., Willaimson, A., Aguero, M., Gonzales, E., and Geeves, W. 2003. Marine invasive alien species: a threat to global biodiversity. Marine Policy, 27(4), 313-323.

Benjamins, S., Harnois, V. H., Smith, L., Johanning, L., Greenhill, C., Wilson, B. 2014. Understanding the potential for marine megafauna entanglement risk from marine renewable energy. Scottish National Heritage Commissioned Report No. 791.

Büche, B. 2021. Grey Seal Breeding Census Skomer Island 2021. NRW Evidence Report number 588 The Wildlife Trust of South and West Wales.

Carter, M. I., Boheme, L., Cronin, M. A., Duck, C. D., Grecian, W. I., Hastei, G. D., Jessop, M., Mattiopoulos, J., M. McConnell, B. J., Miller, D. L., and Morris, C. D. 2022. Sympatric seals, satellite tracking and protected areas: habitat-based distribution estimates for conservation and management. Frontiers in Marine Science.

Coma, R., Linares, C., Ribes, M., Diaz, D., Garrabou, J., and Ballesteros, E. 2006. Consequences of a mass mortality in populations of *Eunicella singularis* (Cnidaria: Octorallia) in Menorca (NW Mediterranean). Marine Ecology Progress Series, 331, 51-60.

d'Avack, E. A. S., Tillin, H., Jackson, E. L., and Tyler-Walters, H. 2014. Assessing the sensitivity of seagrass bed biotopes to pressures associated with marine activities. JNCC Report No: 505, Peterborough: JNCC.

Defra. 2013. Marine Conservation Zones Designation Explanatory Note.

Draget, E. 2014. Environmental Impacs of Offshore WindPower Production in the North Sea: A Literature Overview. WWF Report.

Eden, S. M. C., Anderson, S. Teilmann, J., Carstensen, J., Harders, P. B., Dietz, R., and Miller, L. 2010. The effect of a large Danish offshore wind farm on harbour and grey seal haul-out behaviour. Marien Mammal Science, 26, 614-634.

Ellis, J. R., Milligan, S. P., Readdy, L., Taylor, N., and Brown, M. J. 2012. Spawning and nursery grounds of selected fish species in UK waters, Lowestoft: Sci. Ser. Tech. Rep., Cefas.

Emeana, C. J., Hughes, T. J., Dix, J. K., Gernon, T. M., Henstock, T. J., Thompson, C. E. L., Pilgrim, J. A. 2016. The thermal regime around buried submarine high-voltage cables. Geophysical Journal International, 206(2), 1051-1064.

Farr, H., Ruttenberg, B., Walter, R. K., Wang, Y. H., and White, C. 2021. Potential environmental effects of deepwater floating offshore wind energy facilities. Ocean and Coastal Management, 207, 105611.

Fay, R. R. & Popper, A. N. 2000. Evolution of hearing in vertebrates: the inner ears and processing. Hearing Research, 149, 1-10.

Green, A. E., Unsworth, R. F. K., Chadwick, M. A., and Jones, P. J. S. 2021. Historical analysis exposes catastrophic seagrass loss for the United Kingdom. Frontiers in Plant Science, 12(629962), 1-15.

Hawkins, A. 1993. Underwater noise and fish behaviour. Behaviour of Teleost Fishes, 129-169.

Hicks, N., Lui, X., Gregory, R., Kenny, J., Lucaci, A., Lenzi, L., Peterson, D. M., and Duncan, K. R. 2018. Temperature driven changes in benthic bacterial diversity influences geochemical cycling in coastal sediments. Frontiers in Marine Science, 9(1730).

IMO. 2017. International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). [Online]. Available at: https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx.

JNCC, Natural England, and Countryside Council for Wales. 2010. The protection of marine European Protected Species from injury and disturbance Guidance for the marine area in England and Wales and the UK offshore marine area.

JNCC. 2018. Marine Activities and Pressures Evidence. [Online]. Available at: https://jncc.gov.uk/our-work/marine-activities-and-pressures-evidence/.

JNCC. 2020. Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). [Online]. Available at: https://data.jncc.gov.uk/data/2e60a9a0-4366-4971-9327-2bc409e09784/JNCCReport.

Jones, J., Lock, K., Burton, M., and Newman, P. 2020. Skomer Marine Conservation Zone Sponge Diversity Report 2019. NRW Evidence Report.

Lasker, H. R., Kim, K., and Coffroth, M. A. 1998. Production, settlement, and survival of plexaurid gorgonian recruits.. Marine Ecology Progress Series, 126, 111-123.

Love, M. S., Nishimotoa, M. M., Clark, S., McCrea, M., and Bull, A S. 2017. Assessing potential impacts of energized submarine power cables on crab harvests. Continental Shelf Research, 151, 23-29.

Marine and Coastal Access Act. 2009. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents.

Marine Scotland. 2014. Guidance on the Offence of Harassment at Seal Haul-out Sites.

Meissner, K., Schabelon, H., Bellebaum, J., and Sordyl, H. 2008. Impacts of submarine cables on the marine environment. Institute of Applied Ecology for the Federal Agency of Nature Conservation.

MMO. 2013. Marine conservation zones and marine licensing. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file .

Normandeau (Normandeau Associates Inc.), Exponent Inc, Tricas, T., and Gill, A. 2011. Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. U.S. Department of the Interior.

NRW, 2022. NRW's position on the use of Marine Management Units for screening and assessment in Habitats Regulations Assessments for Special Areas of Conservation with marine mammal features: PS006.

OSPAR. 2019. The OSPAR List of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR. OSPAR Commission.

Pineda, M. C., Duckworth, A., and Webster, N. 2016. Appearance matters: sedimentation effects on different sponge methodologies. Journal of the Marine Biological Association of the United Kingdom, 96(2), 481-492.

Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D., Bartol, S., Carlson, T., Coombs, S., Ellison, W. T., Gentry, R., Halvorsen, M. B., Lokkeborg, S., Rogers, P., Southall, B L., Zeddies, D., and Tavolga, W. 2014. ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report

prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Cham, Switzerland: Springer and ASA Press.

Readman, J. A. J., and Hiscock, K. 2017. *Eunicella verrucosa* Pink sea fan. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Marine Biological Association of the United Kingdom.

Reijinders, P. J. H., Aguilar, A., and Borrell, A. 2009. Pollution and Marine Mammals. In: Encyclopaedia of Marine Mammals (Second Edition). 890-898.

Santos, M. B., and Pierce, G. J. 2003. The diet of harbour porpoise (Phocoena phocoena) in the northeast Atlantic. Oceanography and Marine Biology, 41, 355-390.

SCOS. 2021. Scientific Advice on Matters Related to the Management of Sea Populations.

Scott, K., Harsanyia, P., and Lyndon, A. L. 2018. Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDs) on the commercially important edible crab, Cancer pagurus (L.). Marine Pollution Bulletin, 131, 580-588.

Solan, M., Hauton, C., Godbold, J. A., Wood, C. L., Leighton, G. E., and White, P. 2016. Anthropogenic sources of underwater noise can modify how sediment-dwelling invertebrates mediate ecosystem properties. Scientific Reports, 6(1), 1-9.

Taormina, B., Bald, J., Want, A., Thouzeau, G., Lejart, M., Desroy, M., and Carlier, A. 2018. A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions. Renewable and Sustainable Energy Reviews, 96, 380-391.

Tyler-Walters, H. 2008. Zostera subg. *Zostera marina* Common eelgrass. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Marine Biological Association of the United Kingdom.

Wale, M. A., Simpson, S. D., and Radford, A. N. 2013. Size-dependent physiological responses of shore crabs to single and repeated playback of ship noise. Biol Letters, 9(20121194).

Yoshioka, P. M. 1996. Variable recruitment and its effects on the population and community structure of shallow-water gorgonians. Bulletin of Marine Science, 59, 433 - 443.