REPORT

Pembrokeshire Demonstration Zone Scoping Report

Client: Celtic Sea Power Ltd.

Reference: PC3562-RHD-ZZ-XX-RP-Z-0001

Status: A1/C01

Date: 15 February 2023

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Document title: Pembrokeshire Demonstration Zone Scoping Report

Subtitle:
Reference: PC3562-RHD-ZZ-XX-RP-Z-0001
Status: C01/A1
Date: 15 February 2023
Project name: Pembrokeshire Demonstration Zone
Project number: PC3562

Classification
Project related

Revision history

Revision	Date	Description	Prepared	Checked	Approved
1	20/12/22	Internal Draft	EB	PP	PP
2	05/01/23	Draft for client	EB	PP	PP
3	15/02/23	Final for issue	EB	PP	BD

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Executive Summary

This Scoping Report supports a request for a formal Environmental Impact Assessment (EIA) Scoping Opinion from Natural Resources Wales (NRW) (Offshore: below Mean High Water Springs (MHWS)) and Pembrokeshire County Council (PCC), and Pembrokeshire Coast National Park Authority (PCNPA) (Onshore: above Mean Low Water Springs (MLWS)), for the proposed Pembrokeshire Demonstration Zone (PDZ) (the 'Project'). Celtic Sea Power Ltd. (CSP) (the Applicant) is the seabed lease holder of the PDZ, an area located approximately 15km offshore from the South Pembrokeshire coastline of Wales and comprising a 90km^2 area leased from The Crown Estate for a period of 45 years.

The Project proposes the development of a Multi-connection Offshore Substations (MOS) within the offshore PDZ area. The MOS will provide a managed offshore grid connection point for independent renewables projects. The Project will comprise of the offshore MOS platform, export cables to landfall, and onshore export cables to a grid connection point. The MOS aims to be capable of accommodating approximately 400MW in a phased approach as the market matures. The key drivers for renewable energy in the UK and Wales are reducing greenhouse gas emissions, providing increased energy security, and maximising economic opportunities for the UK, regional, and local economies. The Project aligns closely with these aims. Enabling transmission infrastructure, such as the Project, constitutes a key step towards unlocking the potential of the Celtic Sea for future renewable energy developments and will play a key role in the realisation of the Crown Estate's ongoing area refinement and future seabed leasing process for up to 4GW of commercial scale floating offshore windfarms in the Celtic Sea region by 2035.

By providing a managed offshore grid connection point for future independent offshore marine renewables projects (including floating offshore wind (FOW) and tidal installations) the Project will:

- Remove the need for each future project to secure and construct its own individual route to onshore grid connection, thereby reducing the Levelised Cost of Energy for future projects
- Reduce cumulative environmental impacts and delays, by removing the need to consent, and construct, multiple individual landfalls, and onshore cable infrastructure. This has increased importance in the Pembrokeshire area, which contains numerous areas of ecological and conservation value and a wide range of protected sites.
- Provide a strong and strategic locational signal for developers to locate projects near relevant Welsh port infrastructure.

This Scoping Report considers offshore infrastructure seaward of MHWS, and onshore infrastructure landward of MLWS notably:

- MOS platform, including above- and below-surface infrastructure
- Subsea export cable route to landfall
- Landfall options
- Onshore export cable route
- Onshore substation

The consents, licences and permissions which will be sought by the Applicant for the PDZ are:

- A Transport and Works Act Order (TWAO) under the Transport and Works Act 1992 (only relevant if the PDZ is deemed to interfere with rights of navigation in waters up to the limits of the Welsh territorial sea)
- A Marine Licence under the Marine and Coastal Access Act 2009
- Planning Permission under the Town and County Planning Act 1990

- Section 37 Consent under Electricity Act 1989 to install and keep installed electric lines above ground, with a nominal voltage of less than 132 Kv (only if overhead lines are used, preference is to bury onshore export cables).

An Environmental Statement (ES) is required support to the applications for these consents, licences and permissions. The ES will be informed by the Scoping Opinion on this Scoping Report. This Scoping Report identifies potentially significant environmental effects that will considered for further assessment in the ES. The report provides an overview of the existing physical, biological and human environment, identified by known and accessible data sources, and outlines survey plans to obtain additional data where needed. An overview of potential effects associated with the construction, operation & maintenance, and decommissioning phases of the PDZ is provided. This Scoping Report also outlines the proposed methods for assessment of the significance of effect on technical topics. The following technical topics have been considered:

Physical Environment
Marine Coastal Processes
Marine Sediment and Water Quality
Onshore Geology, Geomorphology and Soils
Onshore Groundwater and Hydrology
Water Framework Directive

Biological Environment
Designated Sites
Benthic Subtidal and Intertidal Ecology
Fish and Shellfish Ecology
Marine Mammals and Reptile Ecology
Terrestrial Ecology
Ornithology

Human Environment
Commercial Fisheries
Shipping and Navigation
Coastal and Marine Infrastructure and Other Users
Aviation and Radar
Archaeology and Cultural Heritage
Land Use
Traffic and Transport
Landscape, Seascape and Visual Impacts
Underwater Noise and Vibration
Onshore Noise and Vibration
Air Quality
Tourism and Recreation
Socio-economics

Acronyms

Acronym	Acronym description
AD	Air Defence
ADD	Acoustic Deterrent Device
AGA	Air-ground-air
AIS	Automatic Identification System
ALC	Agricultural Land Classification
ANSI	American National Standards Institute
AONB	Area of Outstanding National Beauty
AQMA	Air Quality Management Area
ATC	Air Traffic Control
BGS	British Geological Survey
BS	British Standard
BTO	British Trust for Ornithology
CCW	Countryside Council for Wales
CD	Chart Datum
CEMP	Construction Environmental Management Plan
CFB	Coastal Flood Boundary
CMS	Construction Method Statements
cSAC	Candidate Special Area of Conservation
CSP	Celtic Sea Power Ltd.
DBA	Desk-based Assessment
DCO	Development Consent Order
EC	European Commission
EcIA	Ecological impact Assessment
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan

ES	Environmental Statement
ESAS	European Seabirds at Sea
EU	European Union
EU	European Union
FAME	Future of the Atlantic Marine Environment
FLOWW	Fisheries Liaison with Offshore Wind and Wet Renewables Group
FOW	Floating Offshore Wind
ft	Feet
GIS	Geographical information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment 3rd Edition
GN46	Guidance Note 46: Using LANDMAP in Landscape and Visual Impact Assessments
HDD	Horizontal Directional Drilling
HMR	Helicopter Main Routes
HRA	Habitat Regulations Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
INNS	Invasive Non-native Species
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
km	Kilometres
LCOE	Levelised Cost of Energy
LVIA	Landscape and Visual Impact Assessment
MAIB	Marine Accident Investigation Branch
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MCA	Marine Character Area
MCZ	Marine Conservation Zone
MGN	Maritime Guidance Note
MHWS	Mean High Water Springs

MMMP	Marine Mammal Mitigation Protocol
MMMU	Marine Mammal Management Unit
MMO	Marine management Organisation
MoD	Ministry of Defence
MOS	Multi-connection Offshore Substation
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MW	Megawatt
NATS	National Air Traffic Services
NERL	NATS En Route Plc.
NM	Nautical mile
NNR	National nature reserve
NOAA	National Oceanic and Atmospheric Administration
NPA	National Park Authority
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NRMM	Non-Road Mobile Machinery
NRW	Natural Resources Wales
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
ODN	Ordnance Datum Newlyn
ORE	Offshore Renewable Energy
ORPAD	Offshore Renewables Protocol for Archaeological Discoveries
PCNPA	Pembrokeshire Coast National Park Authority
PCSM	Preliminary Conceptual Site Model
PDZ	Pembrokeshire Demonstration Zone
PEA	Preliminary Ecological Appraisal
PEMP	Project Environment Management Plan

PNP	Pembrokeshire Nature Partnership
PRA	Preliminary Risk Assessment
PTS	Permanent Threshold Shift
RNLI	Royal National Lifeboat Institute
ROV	Remote Operated Vehicle
RSPB	Royal Society for the Protection of Birds
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SCA	Seascape Character Area
SCANS-III	Small Cetaceans in the European Atlantic and North Sea
SINC	Site of Importance for Nature Conservation
SLVIA	Seascape, Landscape Visual Impact Assessment
SNH	Scottish Natural Heritage
SPA	Special Protected Area
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SSR	Secondary Surveillance Radar
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
SWWFC	South and West Wales Fishing Communities
TAN	Technical Advice Note
TCPA	Town and Country Planning Act
TTS	Temporary Threshold Shift
TWAO	Transport and Works Act Order
UK	United Kingdom
UKBAP	United Kingdom Biodiversity Action Plan

UKCAA	UK Civil Aviation Authority
UKHab	UK Habitat Classification
UKHO	United Kingdom Hydrographic Office
UKLFS	UK Low Flying Systems
UXO	Unexploded Ordnance
VHF	Very High Frequency
WEFO	Welsh European Funding Office
WFA	Welsh Fishermen's Association
WFD	Water Framework Directive
WHO	World Health Organisation
WWSFA	West Wales Shell Fisherman's Association
WWT	Wildfowl & Wetlands Trust
ZTV	Zone of Theoretical Visibility

1 Introduction

1.1 Purpose of this Report

This environmental Scoping Report has been prepared by Black and Veatch Ltd (BVL), working in association with Royal HaskoningDHV (RHDHV) and Binnies, on behalf of Celtic Sea Power Ltd (CSP). It forms a written request for an opinion on the environmental issues that should be considered, and the appraisal approach to be used, within an Environmental Impact Assessment (EIA) for the proposed Pembrokeshire Demonstration Zone (PDZ) Project. The legislative framework means an EIA is required, as set out in Chapter 2 of this report.

Through this EIA Scoping Report, CSP are consulting Natural Resources Wales (NRW), Pembrokeshire County Council (PCC), and Pembrokeshire Coast National Park Authority (PCNPA) on their opinion as to the scope and level of detail of the information to be provided in the formal Environmental Statement for the offshore (NRW) and onshore (PCC and PNPCA) elements of the project. PCC and PNPCA may wish to issue a joint Scoping Opinion for the onshore elements of this Scoping Report.

1.2 Project Background

The PDZ was originally planned as a site for demonstrating multiple wave, tidal and floating wind energy technologies. Given technology is still maturing, the purpose of this PDZ Scoping report is to focus purely on:

1. The Enabling Infrastructure required within the Pembrokeshire Demonstration Zone Area, i.e., the 400 MW Multi-Connection Offshore Substation (MOS) as described below, and
2. Cable Corridors connecting the Enabling infrastructure to landfall and the ultimate point of connection to the existing electricity transmission system. In addition, the Applicant recognises the significant interest in floating offshore wind beyond the boundary of the PDZ Lease area and the significant benefits that could be realised from a co-ordinated approach between these early mover projects and later commercial phases.
3. The Applicant is therefore committed to the principle of data sharing and coordination with third party floating offshore wind (FOW) projects that may wish to consent infrastructure within the PDZ lease area in future standalone consent applications. For example, survey data generated to inform the EIA for this Project may usefully inform the EIAs of future commercial projects as the Celtic Sea FOW ambitions are realised.

This re-imagined concept design for the PDZ aims to provide a number of key benefits to industry, regulators and stakeholders.

Firstly, by providing a managed offshore grid connection point for future independent offshore marine test and demonstration renewables projects (including FOW and tidal installations) the PDZ MOS will remove the need for each future project to secure and construct its own individual route to onshore grid connection, thereby saving time and costs, which will likely translate into reduced Levelised Cost of Energy (LCOE).

Secondly, the single onshore grid cable corridor and grid connection of the PDZ MOS will reduce cumulative environmental impacts and delays. The alternative of consenting multiple individual cable corridors, landfalls, and onshore cable/overhead line corridors to serve each future renewable development in the wider PDZ area is inefficient (as recognised by the current Offshore Transmission Network Review (UK Government, 2022)). This inefficiency not only increases costs and planning delays associated with the consenting process for each future project, but also increases the potential for cumulative environmental impacts.

Finally, the MOS aims to provide a strong and strategic locational signal for developers to locate projects near relevant Welsh port infrastructure. This will in turn promote a construction supply chain to develop locally and gain experience and expertise in readiness to supply the larger commercial scale projects in the Celtic Sea as and when they arrive. Similarly, marine operations and maintenance capacity will develop in the local area for the long-term servicing of the demonstration and pre-commercial sites that connect to the MOS; this capacity increase means the area will be well-placed to service the large commercial scale projects that will follow (see Section 1.2.2).

1.2.1 Project Area

CSP is the seabed lease holder of the PDZ, an area located approximately 15km offshore from the South Pembrokeshire coastline of Wales and comprising a 90km^2 area leased from The Crown Estate for a period of 45 years (See black hatched are in Figure 2.1). The red line boundary in Figure 2.1 defines the Project Area, the area within which the cables and grid connection could be located. The Project Area encompasses all potential cable landfall locations.

1.2.2 The Crown Estate Celtic Sea Leasing

The UK government has set an ambition to deliver up to 5GW of floating wind by 2030, with rapid expansion anticipated thereafter.

To support this endeavour, and thereby to contribute towards the UK's net zero ambitions, The Crown Estate are delivering a new leasing opportunity in the Celtic Sea for the first generation of commercial-scale floating offshore windfarms – unlocking up to 4GW of new clean energy capacity by 2035, kick-starting industry in the region, and providing power to almost four million homes.

Commercial scale floating wind projects up to 1GW will be leased and developed in a phased approach, allowing the "*development and co-ordination of the necessary infrastructure, such as ports and grid connections, all of which are key to the sustainable development of the UK floating wind sector over the long term".*

The PDZ forms a key component of the enabling grid connection infrastructure to realise the 4GW floating wind ambitions in the Celtic Sea.

1.3 Celtic Sea Power Limited (Project Developer)

CSP is a 100% subsidiary of Cornwall Council with funding from the Welsh European Funding Office (WEFO) and the Swansea Bay City Deal (SBCD) set up to develop the PDZ (the 'Project').

1.4 Consultation to Date

CSP has notified NRW that it intends to submit a Marine License application (with an accompanying EIA).

CSP has engaged in early discussion with NRW to discuss the proposed Project and to support the development of this Scoping Report. Consultation to date on specific issues is displayed in Table 1.1. The consultation included here pertains to the reimagined PDZ as set forth in this Scoping Report; consultation around previous designs of the PDZ is not included.

Table 1.1 Summary of consultation to date

Consultee	Date	Purpose	Outcome
NRW	15/11/2022	To establish approach to marine mammal and seabird baseline characterisation	Discussed the available datasets and approach to baseline characterisation. Agreed that a desktop study is appropriate to characterise the marine mammal and seabird baseline for PDZ EIA. Agreed that the Welsh Marine Mammal Atlas should be used to inform the EIA once it has been published (expected publication 2023).

1.5 Scoping Opinion

It is requested that any correspondence relating to this Scoping Report and the request for a Scoping Opinion is directed to:

Brad Davies (Survey and Consents Manager),
Celtic Sea Power Ltd,
1 Cleddau Bridge Business Park,
Pembroke Dock,
Pembrokeshire,
SA72 6UP
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2 Project Description

2.1 Project Area

CSP is the seabed lease holder of the PDZ, an area located approximately 15km offshore from the South Pembrokeshire coastline of Wales and comprising a 90km^2 area leased from The Crown Estate for a period of 45 years (See Figure 2.1).

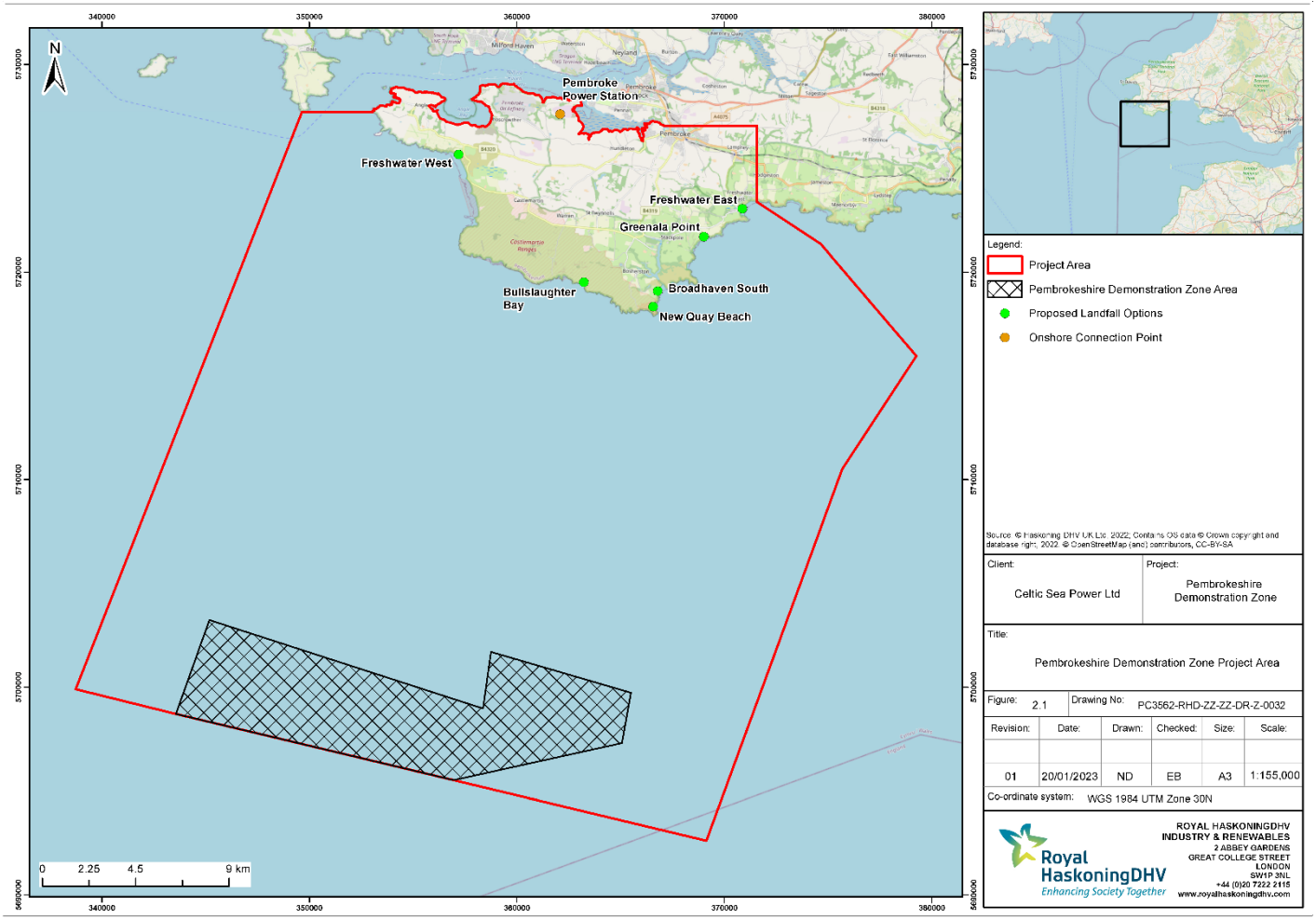


Figure 2.1 The Pembrokeshire Demonstration Zone Project Area

2.2 Design Envelope Approach

The Project Design Envelope approach (also known as the Rochdale Envelope approach) will be adopted for the PDZ assessment, in accordance with current best practice and the National Policy Statement (NPS EN-3 (paragraph 2.6.42)) which recognises that:

"Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application, possibly including:

- *precise location and configuration of turbines and associated development;*
- *foundation type;*
- *exact turbine tip height;*
- *cable type and cable route; and*
- *exact locations of offshore and/or onshore substations."*

It is acknowledged that the PDZ Project will have no generation infrastructure. However, as an offshore renewables transmission asset, the Project is subject to the same uncertainties around future innovations in a fast-moving industry over the course of the project planning phase as generation assets. Therefore, a design envelope approach remains appropriate The PDZ design envelope will provide maximum and minimum parameters where appropriate to ensure the worst-case scenario can be quantified and assessed in the EIA. The project description, including the design envelope, will be detailed here as well as in the EIA Report to provide an overview of proposed infrastructure of the PDZ.

2.3 Pembrokeshire Demonstration Zone Infrastructure

PDZ infrastructure details are summarised within three grouped categories:

- MOS Site: details of the design envelope for the MOS.
- Offshore Export Cable: providing details of the design envelope for the proposed export cable to landfall.
- Landfall: locations under consideration for the onshore/offshore interface for the proposed export to shore cable.
- Onshore Export Cable: providing details of the design envelope for the proposed export cable from landfall to grid connection.

2.3.1 Multi-connection Offshore Substation

The following parameters for the PDZ MOS platform are being considered at this stage, and have been used as a basis for the PDZ Project Design to inform this Scoping Report:

- 1 MOS platform with various foundation types under consideration;
- The MOS platform will have total rating of approx. 400MW capacity
- The MOS platform will have a maximum footprint of ~1,600m^2 and a height above the sea surface of ~45m
- 1 x export cable of 275 kV rating (incl. fibre optical line) from MOS to landfall and grid connection;
- 4 x import cables of 66 kV rating;
- 2 x main power transformer; and
- Reactive compensation for export cables.

The platform will be unattended under normal operations.

2.3.2 MOS Foundations

The exact foundation requirements for the MOS are currently under development. At time of writing, a jacket structure is preferred, with piled foundations. Monopiles and pin piles are under consideration, with installation methods under consideration including percussive piling or vibratory piling.

2.3.3 Navigational Markers

The use of navigational marker buoys to identify the position of the PDZ during operation requires consideration. It is not anticipated that access for commercial and public vessels will be restricted in the PDZ area as a result of the MOS platform. However, a navigational assessment of the site will be carried out as part of the future design development and consenting process to determine this.

In the event that marker buoys are deemed not appropriate, then alternatives will be considered. The site will be marked on the UK hydrographic charts and the developer will liaise with the Maritime Coastguard Agency (MCA), United Kingdom Hydrographic Office (UKHO), and Trinity House to ensure that the site is marked in accordance with the marine guidance notes and international navigational standards.

2.3.4 Marine Export Cables

The Project will have one export cable from the MOS platform to landfall. The Applicant is committed to strategic survey and data and report sharing which could facilitate the EIA process for export cables of future third party commercial scale projects that may wish to utilise the same export cable corridor. It is expected that the export cables will run in close proximity to each other and within the same cable corridor.

The cable corridor to landfall is expected to be ~ 30 – 40km in length (depending on landfall location). The cable will be routed to avoid sensitive habitats wherever possible.

Export cables are often a point of vulnerability offshore renewable installations as failure in the transmission asset can render the entire generating asset inoperative. Damage, once in operation, usually arises from external aggression originating from fishing operations or vessel anchoring. To overcome this, and to provide security during installation, cables are usually separated by a distance that is a function of water depth (should third party projects choose to utilise the same export cable corridor). In the water depths envisaged along the export route from the windfarm area to shore, we would expect this separation to be a minimum of 50m with a base case of two times the water depth, with export cables converging locally at the onshore landing point. The aim will be to route the export cable through areas where there is sufficient sediment to allow for burial, whilst avoiding side slopes, variable seabed conditions, and environmentally sensitive areas.

2.3.5 Landfall

There are currently six landfall locations under consideration:

- Freshwater West;
- Bullslaughter Bay;
- New Quay Beach;
- Broadhaven South;
- Greenala Point; and
- Freshwater East.

CSP plans to reduce the number of landfall options, thereby refining the terrestrial and marine area of search for cable routing, through an ongoing constraints analysis. The landfall locations are displayed in Figure 2.1.

2.3.6 Onshore Cabling

It is assumed that onshore cables will be buried if crossing Pembrokeshire National Park is required, unless feedback is provided on a lower impact option for crossing the Park. The preferred option at present is for all cables to be buried; however, this has not been confirmed and overhead lines may be considered outside of the National Park.

It is assumed that the grid connection point will be at Pembroke Power Station Grid Supply Point. The preferred option is to connect at the National Grid operated substation located at the Pembroke Power Station. Alternatively a dedicated substation will be built in the vicinity (likely within 2km) of Pembroke Power Station, connecting to the 400kV Transmission Network line that runs from Pembroke Power Station eastwards towards Swansea North (see ORE Catapult, 2021).

Indicative cable routes for buried cables between the landfall options and the grid connection are currently under development. This analysis will be carried out as part of the next stage of Project development.

2.4 Pembrokeshire Demonstration Zone Project Timeline

At the time of writing, surveys to inform the project design and EIA will begin in 2023, with applications for marine licence and planning permission in 2024. Construction of the Project is expected to begin in 2025, with provision of the first offshore grid connection established in 2026. With a 30 year operating lifespan, decommissioning (or refurbishment) of the Project is expected to occur in 2056.

2.5 Construction

2.5.1 Offshore

The MOS platform is likely to be installed using specialist installation vessels using either jack-up, anchors or dynamic positioning technology. Different methods will be required for installation of foundations dependent upon the type(s) chosen. Jacket structure, with piled foundations is the preferred foundation type, however the installation methods under consideration include:

- Monopile;
- Suction bucket monopile;
- Gravity base;
- Pin-piled;
- Jacket;
- Suction bucket jacket.

Some of these methods may first require seabed preparation to level the area (such as dredging) before placement of foundations.

In general, little or no preparation of the seabed is required for laying cables directly on the seabed. However, marine surveys carried out as part of the route selection and optimisation may indicate sections where some preparation is required, for example mass flow excavation (moving sediments to create a flatter seabed profile), boulder removal, and pre-lay grapnel run to remove any man-made obstacles..

Following site preparation (if required), the marine export cables may be laid directly on the seabed by purpose built vessels and protected with one or a variety of cable protection options, or they may be trenched and back-filled. The preference is to trench and backfill cables wherever possible and this will be taken into account in the routing of offshore export cables.

Under normal circumstances, any disused cables along the route will be severed with owner's permission. For live cable crossings, formal agreements will be made with the asset owner. The physical design of any crossing will depend on the size, type, location and buried state of the crossed infrastructure. Generally, cables cross infrastructure on a 'bridge' comprised of either aggregate or concrete mattresses. Cable crossings at 90^0 will be preferred. At landfall, it is expected that the cables will either be trenched or HDD will be used, depending on the final export cable route and landfall location.

2.5.2 Onshore

Construction works needed to install onshore cabling and infrastructure will be dependent on the final design with regards to: landfall works; location and design of transition pit; location and design of substation; onshore cable voltage; whether cables will be underground or overhead; and, grid connection details. Construction methods will be considered as part of future design development and appraisal.

2.6 Operation and Maintenance

During operation and maintenance, it is likely that the offshore cables will need routine surveying using standard geophysical survey equipment and/or Remotely Operated Vehicles (ROVs) to determine the location, disturbance and integrity of both the cabling and the protection used. Monitoring is particularly important in the initial years of operation to establish if the local environmental conditions change significantly, as a result of sediment movement or scour, for example Hereafter, once the stability of the environment and it's interaction with installed subsurface infrastructure has been established, it is expected that marine cables will require less routine maintenance. If a cable fault is detected, the relevant section of cable will be retrieved to the surface for inspection and, if required, replaced.

Operation and maintenance activities for landfall works and onshore cabling and infrastructure will be dependent on the final design. Routine maintenance on the onshore cables is not anticipated other than periodic inspection of the onshore cable route. Non-scheduled maintenance to address faults if and when these arise may also be necessary.

2.7 Decommissioning

CSP recognises the importance of considering the decommissioning process at an early stage. The least environmentally damaging option and the usual approach for submarine cables is to leave the cable in-situ and this is the expected approach for PDZ. This will be assessed in the EIA.

Options for decommissioning of the MOS platform are being considered, will be refined in consultation with relevant stakeholders, and will be set forth in a decommissioning plan. Industry best practice will be considered and implemented in the decommissioning plan.

3 Policy and Legislative Context

The following section sets out the key policy and legislation of relevance to the PDZ.

3.1.1 Brexit

In 2017, the UK government triggered article 50 of the Treaty of the European Union with the UK formally withdrawing from the EU on 31st January 2020. This was followed by a transition period until the end of 2020 while the UK and the EU negotiated additional arrangements.

Fundamentally, the European Union (Withdrawal) Bill (leading to the European Union (Withdrawal Agreement) Act 2020) was designed to keep in place all EU-derived domestic legislation (such as the many statutory instruments that implement EU environmental directives) and to incorporate direct EU legislation such as EU environmental regulations into domestic law.

In November 2021 the government passed the Environment Act. The Environment Act makes provisions for a range of matters, including (inter alia): provision for targets, plans and policies for improving the natural environment; creation of the Office for Environmental Protection; and a range of measures in relation to nature and biodiversity, water, and air quality.

Notably, the UK legislation relating to Climate Change and Renewable Energy Policy is underpinned by a number of international agreements (e.g. EU and United Nations (UN)), as outlined in the sections below.

3.1.2 Kyoto Protocol to the United Nations Framework Convention on Climate Change

The UK is a signatory to the Kyoto Protocol which commits state parties to reduce greenhouse gas emissions, which came into effect in 2005. Its commitments were transposed into UK law by the Climate Change Act 2008, which requires the net UK carbon account for the year 2050 to be 80% lower than the 1990 baseline.

3.1.3 The Climate Change Act 2008

The Climate Change Act 2008 commits the UK to a net reduction in greenhouse gas emissions against the 1990 baseline by 2050.The Act implements the UK's commitments under the Kyoto protocol (to which the UK is a signatory). This is implemented through a system of carbon budgets, which are set by the Government for a period of five years each.

Whilst the Act committed the UK to a long-term emissions reduction target of reducing greenhouse gas emissions by 80% by 2050, compared to 1990 levels, this target has been amended to a net zero contribution to global emissions by 2050.

3.1.4 European Union Renewables Directive/Renewable Energy Directive

At an EU level, this requires a reduction of 20% in greenhouse gases by 2020 (below 1990 levels); and 20% of the total EU energy (electricity, heat and fuel) consumption is to come from renewable sources by 2020. In 2017, the Welsh Government declared its target of meeting 70% of Wales' electricity demand from renewable electricity sources by 2030 (Welsh Government, 2018). In addition, The Welsh Government has also declared an ambition to reach net zero by 2050.

3.2 Welsh Policy and Legislation

3.2.1 Welsh National Marine Plan

The Welsh National Marine Plan (WNMP) was published in 2019. The policies set out in the Marine Plan and the associated Implementation Guidance have been considered in this Scoping Report. The WNMP contains policy across a range of considerations (including nature conservation, sustainable use, seascape, and coastal communities and economic growth). The WNMP includes sector objectives for renewable energy to support decarbonisation of the Welsh economy and the use of marine renewable energy generation (including offshore wind farms (OWF)).

3.2.2 Local Planning Policy

A new Local Development plan has been adopted by the local authority (Pembrokeshire Coast National Park Authority) (PCNPA, 2020). The Plan includes the long-term vision for the Pembrokeshire Coast National Park and the objectives and land use policies needed to deliver that vision.

3.2.3 National Policy Statements

Although the Project is not seeking a Development Consent Order, the capacity of energy generation it aims to support (2.4GW) means it is representative of a Nationally Significant Infrastructure Project (NSIP), therefore guidance relevant to NSIPs is considered appropriate to use for this Project. Guidance that is relevant to assessing impacts for NSIPs is set out within National Policy Statements (NPSs) which are the principal decision-making documents for NSIPs. Those relevant to the Project are:

- Draft Overarching NPS for Energy (EN-1) (Department for Business Energy and Industrial Strategy (BEIS), 2021).
- Draft NPS for Electricity Networks Infrastructure (EN-5) (Department for Business Energy and Industrial Strategy (BEIS), 2021).

These documents are currently in draft and therefore the final updated versions of NPS EN-1 and NPS EN-5 will be considered during the PDZ EIA if available.

3.3 Planning Legislation

3.4 Environmental Impact Assessment Regulations

EIA was introduced under the European Union (EU)EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). In 2011, the original EIA Directive and amendments were translated into EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU).

The EIA will fulfil the requirements of the following:

- Marine Licence under the Marine and Coastal Access Act 2009
- Planning Permission The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017
- The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017

3.5 The Habitats and Birds Directive and Associated Regulations

The Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992, providing a means for the EU to meet its obligations under the Bern Convention. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status. This protection is granted through the designation of European Sites (now known as the 'UK National site network[1]') and European Protected Species (EPS).

The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) provides a framework for the conservation and management of wild birds within Europe. The Directive affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs).

As a matter of UK policy, internationally designated wetland sites, Ramsar sites, are also considered through the HRA process.

The Directives have been transposed into UK Law by various regulations, those of relevance to the Project include:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- the Conservation of Habitats and Species Regulations 2017; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within UK waters from 12 nm out to 200nm, or the limit of the UK Continental Shelf Designated Area).

These are hereafter referred to as the Habitats Regulations.

The Habitats Regulations require that where a plan or project that is not directly connected with, or necessary to the management of a European site, but likely to have a significant effect, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. Section 6.1 outlines the potential for impacts to designated sites and will inform a HRA screening exercise to be carried out following further refinement of Project design and cable routing.

3.6 European Protected Species (EPS) Licensing

EPS are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under the Habitats Regulations. If any activity is likely to cause disturbance or injury to an EPS a licence is required to undertake the activity legally.

Activities which can be licenced under EPS licences include those such as subsea noise disturbance to marine mammals due to piling construction activities. EPS licences are obtained from NRW or the Welsh Ministers, depending on the reason for the licence application. Although the grant of EPS licences is separate to the Section 36 and marine licence application process, it can be considered in parallel by NRW in order to constrict timelines.

Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consenting authority during the pre-construction phase of the PDZ.

[1] *The UK National site network is made up of SACs and SPAs designated at various points in time before exit day (i.e., UK sites that formed part of the EU's Natura 2000 network prior to exit day), and any sites designated under the Habitats Regulations after exit day.*

4 Approach to Scoping and EIA

4.1 Introduction

This section describes the methodology that will be applied to the PDZ EIA. It outlines the methodology for the identification and evaluation of potential likely significant environmental effects (as defined in the EIA Regulations) and presents the proposed methodology for the identification and evaluation of potential cumulative and inter-related impacts, which includes due consideration of potential transboundary effects.

4.2 Study Area

For the purposes of Scoping, a core Project Area was developed to include the whole area within which infrastructure could be placed given the current Project Envelope (see Figure 2.1). Study Areas were then established based around the Project Area for each environmental aspect, according to their specific characteristics. Details of each Study Area, and the rationale for how they were defined, are provided in the relevant sections of the technical chapters.

4.3 Guidance and Best Practice

A systematic and auditable evidence-based approach will be followed to evaluate and interpret the potential effects on physical, biological and human receptors.

The EIA is an assessment of the potential impacts of the development could have on the environment and identification of key receptors. These potential impacts can be positive or negative. The scoping report identifies the significant environmental effects which may occur and what outline mitigation methods or management can be used to reduce or removed these impacts to an acceptable level.

The EIA process is a systematic and on-going process that continues throughout the development phase until construction is complete. The process involves a detailed understanding of both the project and the environment that the systems are to be installed in, and the significance of these effects on the receptors within this area of impact from the development.

The following guidance and best practice documents have been used in development of this Scoping Report:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Environmental impact assessment for offshore renewable energy projects (British Standards Institute (BSI), 2015);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2012);
- IEMA Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2015); and
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (The Planning Inspectorate, 2019).

4.4 Need for Onshore EIA

The need for an EIA under The Town and Country Planning EIA Regulations will depend on the final design including the location and size of transition pits, substations, onshore cable routes and the interactions of this infrastructure with sensitive features. Given that the landfall site options and associated onshore cable all have potential to affect internationally and nationally designated sites, it is currently assumed that an EIA will be needed under the Town and Country Planning EIA Regulations. Future design development will aim to minimise adverse effects, meaning the need for an EIA for onshore works will be reviewed in the future.

4.5 Stakeholder consultation

Regular consultation with stakeholders is key to the success of the EIA process and will be undertaken throughout the assessment and site selection work.

CSP will develop a Project Communications Plan that will guide stakeholder consultation for all phases of the project, including a communications protocol and strategy for key stakeholders. Communications with statutory consultees, the public, community bodies, elected representatives and the media for the Project will be co-ordinated by the project team. This consultation process is likely to include websites, public exhibitions, meetings and press releases. The outcomes of consultation with the public will be recorded in appropriate sections of the ES.

4.6 Assessment Methodology

The EIA will be undertaken in accordance with the Planning Act 2008and the EIA Regulations. Furthermore, the approach to the EIA and the production of the resulting ES document will closely follow relevant guidance including:

- Draft Overarching NPS for Energy EN-1 and Draft NPS for Electricity Networks Infrastructure EN-5 (as previously discussed although the Project is not classified as a NSIP the draft NPSs are considered useful guidance)
- Relevant guidance issued by NRW and other government and non-governmental organisations; and
- Receptor/topic specific guidance documents.

The EIA will also have due regard to the requirements of the Habitats and Species Regulations 2017 and the Marine and Coastal Access Act 2009.

Within the ES, the assessment of each receptor topic (e.g., physical processes, marine mammals, infrastructure and other users etc.) will be included in a separate chapter. The receptor topic chapters that will be included in the ES are included as chapters in this Scoping Report. Within each of the receptor topic chapters, the following matters will be considered:

- Identification of the study area for the topic-specific assessments;
- Description of the planning policy and guidance context;
- Summary of consultation activity, including comments received in the Scoping Opinion;
- Description of the environmental baseline conditions; and
- Presentation of impact assessment, which includes:
    - Identification of the maximum design scenario for each impact assessment;
    - A description of the measures adopted as part of the Project, including mitigation and design measures which seek to prevent, reduce or offset environmental effects; and

- Identification of likely impacts and assessment of the significance of identified effects, taking into account any mitigation measures adopted as part of the Project.
- Identification of any further mitigation measures required in respect of LSE (in addition to those measures adopted as part of the Project), together with consideration of any residual effects;
- Identification of any future monitoring required;
- Assessment of any cumulative effects with other major developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was
- collected); and
- Assessment of any transboundary effects (i.e., effects on other European Economic Area (EEA) states).

4.6.1 Determining Receptor Sensitivity and Value

The sensitivity of a receptor is determined through its ability to accommodate change and on its ability to recover if it is affected. Receptor sensitivity will be assigned on the basis of species-specific adaptability, tolerance, and recoverability, when exposed to a potential impact. The following parameters will be taken into account:

- Timing of the impact: whether impacts overlap with critical periods of the receptor, e.g., life-stages or seasons for ecological receptors; and
- Probability of the receptor-effect interaction occurring (e.g., vulnerability).

The value of the receptor forms an important element within the assessment. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor has a key role in the ecosystem function. It is important to understand that high value and high sensitivity are not necessarily linked within a particular impact. A receptor could be of high value but have a low or negligible physical/ecological sensitivity to an effect. Similarly, low value does not equate to low sensitivity and is judged on a receptor-by-receptor basis.

The overall receptor sensitivity is, therefore, determined by considering a combination of value, adaptability, tolerance and recoverability as well as applying professional judgement and/or past experience.

4.6.2 Predicting Magnitude of Impacts

The impact magnitude is determined by the interaction between the scale of the effect in time, area and intensity. It is important to note that a change resulting from a proposed development can be positive or negative and this is reflected in Table 4.1 which sets out the criteria used to determine the magnitude of change.

With respect to duration of potential impacts, those associated with construction will be considered to be short term, occurring over a maximum of 2 years following construction. Impacts associated with operation will be considered long term, occurring over the operational lifetime of the Project.

4.6.3 Evaluation of Significance

The significance of potential effects will be defined by considering receptor sensitivity in combination with the magnitude of a given impact. Where there is a lack of suitable data to quantitatively assess impacts for

the receptor under consideration, the assessment will be informed by professional experience and judgement.

Subsequent to establishing the receptor sensitivity and magnitude of impact, the effect significance will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in Table 4.1 will be used to aid assessment of effect significance based on expert judgement, latest guidance and any specific input from consultation. The matrix is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each impact assessment and it is not a prescriptive formulaic method. To some extent, defining impact significance is qualitative and reliant on professional experience, interpretation and judgement.

A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration. For the purposes of the EIA, major and moderate adverse impacts are deemed to be significant, and, a such, may require mitigation. Whilst minor impacts are not significant in their own right, these may contribute to significant impacts cumulatively or through interactions.

Table 4.1 Matrix for evaluating the significance of an impact

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

Through use of this matrix, an assessment of the significance of an impact would be made in accordance with the definitions in Table 4.2.

Table 4.2 Definitions of impact significance

Impact Significance	Definition
Major adverse	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate adverse	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor adverse	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
Minor beneficial	The impact is of minor significance but has been assessed as having some benefit to receptor condition.
Moderate beneficial	The impact is assessed as providing a moderate benefit to receptor condition.
Major beneficial	The impact is assessed as providing a significant benefit to receptor condition.

4.6.4 Mitigation and Monitoring

Where an impact assessment identifies that an aspect of the project is likely to give rise to significant environmental impacts, mitigation measures will be proposed, in order to avoid impacts or reduce them to acceptable levels.

Mitigation will take place in the following hierarchy, where the first is not feasible due to constraints, including, engineering, technology or geology, the next measure will be engaged.

1. The Project will be designed to avoid placing permanent infrastructure or having temporary working areas within protected sites, where possible.
2. If avoidance of protected sites is not possible, best endeavours will be made to design the Project to avoid direct impact on the specified features of interest within protected sites via specific construction and decommissioning methods, where possible.
3. Where the feature is not static, the design of the infrastructure of the Project must, where practicable, minimise impact on mobile species, therefore reducing the interaction and harm.
4. Where avoidance of features of interest are not possible, mitigation measure will be developed for construction, operation and decommissioning to minimise effects, such as work schedule, techniques and working areas, and agree reinstatement of temporary works with regulatory authorities, offsetting or enhancement measures.

It is important to note that the mitigation measures applied should be proportionate to the scale of the impact predicted. Appropriate mitigation measures will be discussed and agreed, where possible, with the relevant regulatory authorities and stakeholders.

In some cases, in order to ensure that the mitigation measures are successful or where there is significant uncertainty with respect to important receptors, monitoring may be appropriate. Monitoring programmes are most commonly required during and shortly after construction but can also be prior to and during operations. The nature of any monitoring will be dependent on the nature of the effect or mitigation measure under inspection.

4.6.5 Cumulative effects

For some topics (where for example the receptors include highly mobile or migratory species, fishing or shipping) the cumulative effects assessment will have a large geographic scale and involve in many plans and projects, for others where receptors (or impact ranges) are more spatially fixed the cumulative effects assessment will be narrower. The scope of the cumulative effects assessment will therefore be established on a topic-by-topic basis with the relevant consultees as the EIA progresses.

4.6.6 Inter-Related Effects

The impact assessment will consider the inter-relationship of impacts on individual receptors. The objective will be to identify where the accumulation of residual impacts on a single receptor, and the relationship between those impacts, gives rise to a need for additional mitigation. When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of negligible or greater residual impacts are identified, they will be considered further.

4.6.7 Transboundary Effects

Transboundary effects arise when impacts from the Development within one EEA state affects the environment of another EEA state(s). The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the ‘Espoo Convention’). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

The procedures involve providing information to the Member State and for the Welsh Ministers to enter into consultation with that State regarding the significant impacts of the development and the associated mitigation measures.

Transboundary impacts, like cumulative impacts, are considered on a topic-by-topic basis. In terms of the Project, transboundary impacts will relate primarily to projects that may affect mobile species, and to projects that are located close to the national boundaries, or to areas administered by other relevant authorities.

5 The Physical Environment

5.1 Marine Coastal Processes

This section describes the marine coastal processes baseline environment and potential effects associated with the construction, operation and decommissioning of the PDZ.

The Welsh National Marine Plan includes the following policy of relevance to the Marine Coastal Processes assessment for the PDZ:

Policy SOC_09, Effects on coastal change and flooding

"Proposals should demonstrate how they:

- *avoid significant adverse impacts upon coastal processes; and*
- *minimise the risk of coastal change and flooding;*

Proposals that align with the relevant Shoreline Management Plan(s) and its policies are encouraged."

5.1.1 Data and Information Sources

The principal data sources that have been used to inform this chapter of the EIA Scoping are:

- Tide Tables (UKHO, 2017a), which contain astronomical tidal levels for key locations around the adjacent South Wales coastline;
- Admiralty Charts of various dates (UKHO, 2022), which contains tidal diamonds showing peak tidal currents at various locations across the seabed;
- Tidal Stream Atlas (UKHO, 2016), which shows tidal current velocities through the tidal cycle at various locations;
- Atlas of UK Marine Renewable Energy (Atlas, 2022), which provides information on wind, waves and tides;
- WaveNet (Cefas, 2022), which provides near real time and historic wave data from a network of buoys around the UK coast;
- Climate Projections 2018 (UKCP18, 2022), projects how climate change may affect marine parameters over future years and decades;
- Environmental information collected for the cancelled Atlantic Array OWF (RWE, 2013)
- Wave Hub Pembrokeshire Wave Energy Demonstration Zone Feasibility Study – Metocean Desktop Study (2017), which collates information from the above sources;
- Wave Hub Pembrokeshire Wave Energy Demonstration Zone Feasibility Study – Metocean Desktop Study Addendum (2017), which updates the Metocean Desktop Study using hindcast wind and wave data from the National Oceanic and Atmospheric Administration (NOAA) Wavewatch III model;
- British Geological Survey maps and lexicon (BGS, 2017a; BGS, 2017b), which provide information on land and marine geological units, Quaternary deposits and sea bed sediments together with conventions for naming those units;
- Shoreline Management Plan 2 (Halcrow, 2012), which contains information on short-, medium- and long-term policies for the stretches of coast that contain the proposed landfalls; and
- GIS Mapping System (WAM, 2017), which describes the type, amount and distribution of activities carried out on the southwest Wales coast including management issues and conservation layers

5.1.2 Study Area

The Study Area for this Scoping Assessment is the southwest Pembrokeshire coast and the immediate marine areas of the northwest Bristol Channel, which are encompassed within this Project Area (Figure 2.1).

5.1.3 Existing Environment

This section provides a high-level description of the baseline physical and sedimentary processes of the coastal and marine areas at and adjacent to the Project Area.

5.1.3.1 Bathymetry

The bathymetry of the Project Area has been derived from the Admiralty Charts[2] which show charted spot depths (below Chart Datum) within the Project Area, which is in deep water, ranging from around 54 – 62m in the offshore PDZ area.

5.1.3.2 Water Levels and Tidal Range

The UK Admiralty Tide Tables provide information on the astronomical tidal levels at a series of locations around the UK coastline. Of these, the nearest to the PDZ is at the Port of Milford Haven. The astronomical tidal levels at Milford Haven are shown in Table 5.1.

Table 5.1 Astronomical Tidal Levels at Milford Haven (Source: UK Admiralty Tide Tables 2017)

Parameter	Magnitude	Comments
Highest astronomical tide (HAT)	7.9 m CD	Chart Datum (CD) is 3.71 m below Ordnance Datum Newlyn (ODN).
Mean high water springs (MHWS)	7.0 m CD	
Mean high water neaps (MHWN)	5.2 m CD	
Mean sea level (MSL)	3.8 m CD	
Mean low water neaps (MLWN)	2.5 m CD	
Mean low water springs (MLWS)	0.7 m CD	
Lowest astronomical tide (LAT)	0.0 m CD	

Astronomical tidal levels are governed by the relative gravitational effects of the Earth, Sun and Moon and are predictable to high levels of accuracy. These can, however, be affected by meteorological effects such as wind or atmospheric pressure which can elevate or depress the anticipated astronomical water levels. When water levels are elevated, the effect is known as a positive surge. The latest suite of UK climate projections (UKCP18) provide analysis of the water levels that may be anticipated associated with a positive surge under 'extreme' events of different return periods of occurrence. Table 5.2 shows the latest published extreme sea level values (to a base date of 2017), based on the nearest model output point off the Pembrokeshire coast (see Plate 5.1).

[2] *Charts consulted were 1478-0: Saint Govan; 1076-0: Linney Head to Oxwich Point; and 1178-0: Approaches to the Bristol Channel.*

Table 5.2 Extreme Water Levels off the Pembrokeshire coast

Parameter	Extreme water Level (mODN)	Comments
1 in 1 year return period	4.33	Chart Datum (CD) is 3.71 m below Ordnance Datum Newlyn (ODN)
1 in 10 year return period	4.61	
1 in 25 year return period	4.72	
1 in 50 year return period	4.80	
1 in 100 year return period	4.88	
1 in 200 year return period	4.96	
1 in 500 year return period	5.08	

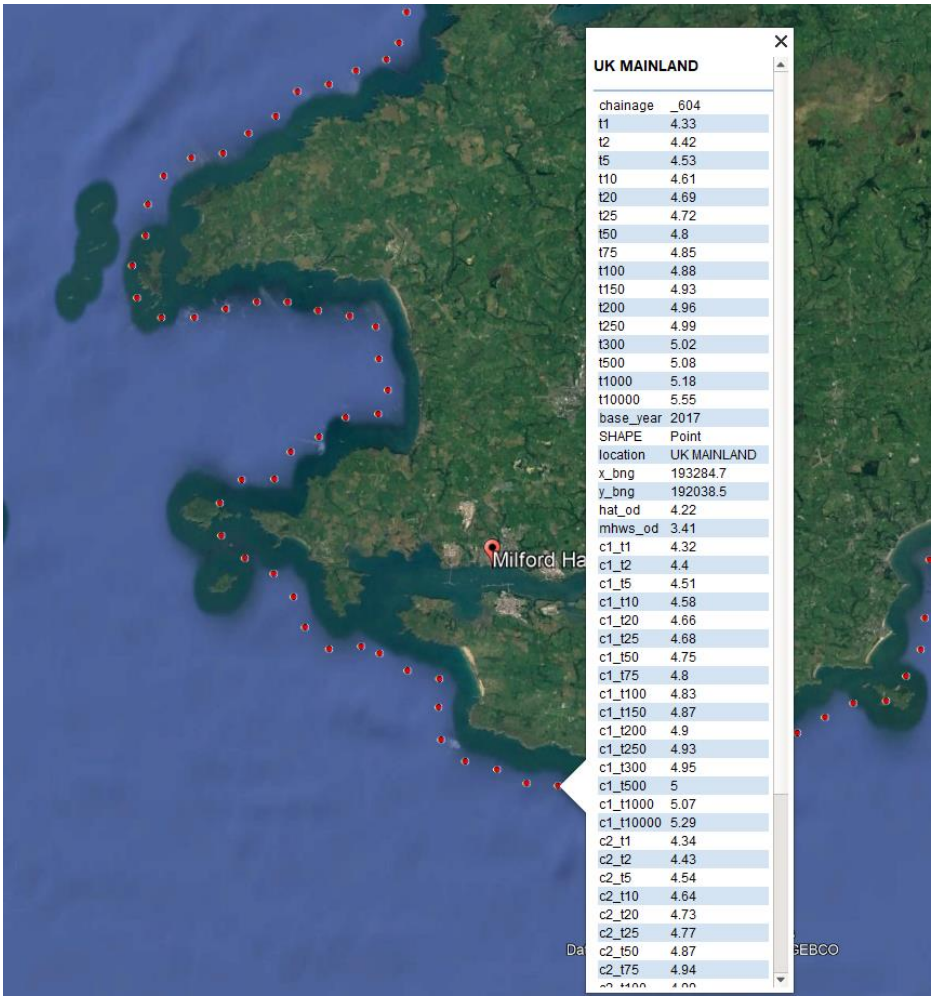


Plate 5.1 Location of CFB output point used in Table 5.2.

The mean spring tidal range at Milford Haven is 6.3 m, while the mean neap tidal range is 2.7 m. The tidal range within the PDZ site is provided by the Atlas of UK Marine Renewable Energy and is presented in Table 5.3.

Table 5.3 Tidal Range Parameters within the PDZ site (Source: Atlas, 2022)

Parameter	Magnitude within offshore PDZ area
Mean spring tidal range	6.3 m
Mean neap tidal range	3.1 m

5.1.3.3 Tidal Currents

Tidal current streams across the Project Area are generally aligned west-northwest to eastsoutheast, as shown by the ellipses of tidal excursion within the Atlas of UK Marine Renewable Energy and the tidal streams on the UK Hydrographic Office Tidal Stream Atlas. The tide flows from westnorthwest to east-southeast on the flood and reverses in direction on the ebb. The mean spring and mean neap astronomical tidal current velocities in seabed areas close to the Project Area are provided as Tidal Diamonds on the relevant Admiralty Charts[3].

Table 5.4 presents the current direction (°) and speeds (converted from knots to m/s) from relevant Tidal Diamonds close to the PDZ. The times are relative to high water at Cardiff (Diamond A) or Milford Haven (Diamonds B and G).

Table 5.4 Tidal Current Parameters from Tidal Diamonds Nearest to the Project (Source: UK Hydrographic Office Admiralty Charts)

Time relative to High Water (hrs)	1076 (A)			1478 (B)			1178 (G)		
	Current direction (°)	Spring current speed (m/s)	Neap current speed (m/s)	Current direction (°)	Spring current speed (m/s)	Neap current speed (m/s)	Current direction (°)	Spring current speed (m/s)	Neap current speed (m/s)
-6	115	0.4	0.2	77	0.7	0.4	160	0.3	0.1
-5	104	0.8	0.4	76	1.1	0.5	95	0.5	0.2
-4	100	1.2	0.6	76	1.3	0.6	76	0.7	0.3
-3	99	1.2	0.6	76	1.2	0.6	75	0.9	0.4
-2	97	0.9	0.4	78	0.7	0.4	70	0.7	0.4
-1	92	0.3	0.1	250	0.3	0.1	65	0.4	0.2
0	334	0.2	0.1	258	1.0	0.5	97	0.1	0.1
1	288	0.7	0.3	253	1.1	0.5	243	0.3	0.2
2	282	1.1	0.5	257	1.1	0.5	260	0.7	0.3
3	279	1.1	0.5	258	1.0	0.5	265	0.9	0.4
4	276	1.0	0.5	259	0.5	0.2	267	0.8	0.4
5	270	0.6	0.3	67	0.1	0.1	246	0.6	0.3
6	159	0.1	0.1	77	0.6	0.3	190	0.2	0.1

Information relating to the tidal regime directly within the Project Area is provided by the Atlas of UK Marine Renewable Energy (Table 5.5).

Table 5.5 Tidal Current Parameters within the PDZ (Source: Atlas, 2022)

Parameter	Magnitude within offshore PDZ area
Peak flow for a mean spring tide	0.9 m/s
Peak flow for a mean neap tide	0.5 m/s

[3] *Charts consulted were 1478-0: Saint Govan; 1076-0: Linney Head to Oxwich Point; and 1178-0: Approaches to the Bristol Channel.*

5.1.3.4 Wind

The Atlas of UK Marine Renewable Energy provides information relating to the wind regime within the PDZ (Table 5.6).

Table 5.6 Wind Parameters within the PDZ at 100 m above mean sea level (Source: Atlas, 2022)

Parameter	Magnitude within offshore PDZ area
Annual mean wind speed	10.0 m/s
Spring mean wind speed	9.5 m/s
Summer mean wind speed	7.7 m/s
Autumn mean wind speed	10.8 m/s
Winter mean wind speed	12.2 m/s

Due to the relative paucity of data relating to the wind regime within the Project Area, further detail was obtained through acquisition and analysis of National Oceanic and Atmospheric Administration (NOAA) data from a location at 51.50°N, 50°W at an altitude of 10 m above mean sea level. Results show the average annual winds predominantly approach from the west, westsouthwest and southwest sectors, with an annual average wind speed of 6.86 m/s across all directions at 10 m above mean sea level (Plate 5.2).

Extreme wind speeds can reach 18 m/s on a 1 in 1 year frequency and 32 m/s on a 1 in 500-year frequency at 10 m above mean sea level.

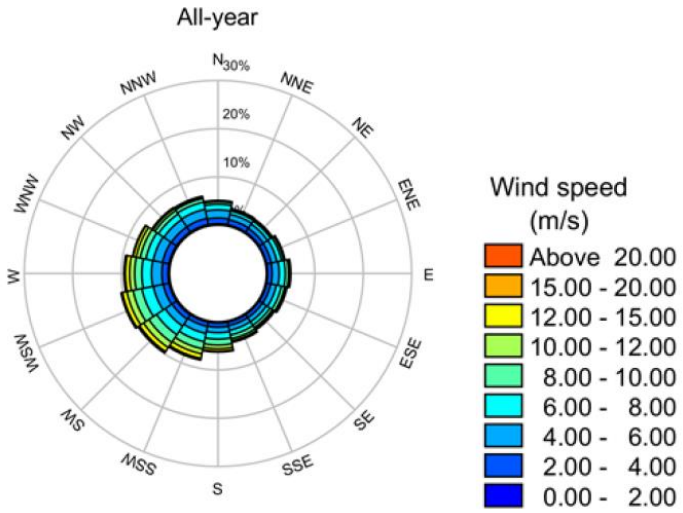


Plate 5.2 Wind Rose within the Project Area (annual average wind speed at 10 m above mean sea level)

5.1.3.5 Waves

Due to the relative paucity of data relating to the wave regime directly within the Project Area, NOAA data was acquired and analysed from a location at 51.50°N, 50°W. Results show the average annual wave heights predominantly approach from the west-southwest sector, with an annual average significant wave height of 1.79 m and annual average peak period of 9.8 s. Extreme significant wave heights can approach 8 m on a 1 in 1 year frequency and exceed 12 m on a 1 in 500-year frequency. Corresponding extreme wave periods during these events are 14 s and 18 s respectively (Plate 5.3).

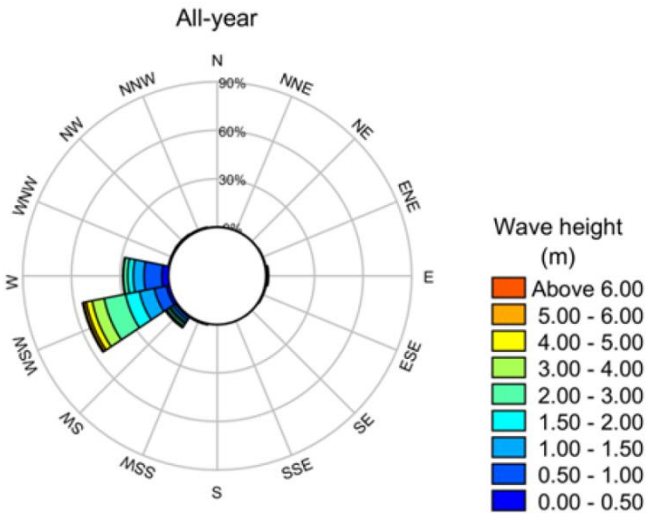


Plate 5.3 Wave Rose within the Project Area

5.1.3.6 Climate Change

The latest climate change projections were updated in 2018 and released on a web-based User Interface that can be interrogated to derive changes in relative sea level under different 'Representative Concentration Pathways' (RCPs). Taking a model grid cell off the Pembrokeshire coast (see Plate 5.4), Table 5.7 shows the latest published changes in relative sea level (to a base date of 'the 1990s').

Table 5.7 Projected changes in relative sea level off the Pembrokeshire coast (source: UKCP18)

	RCP2.6				RCP4.5				RCP8.5			
Year	5%ile	50%ile	70%ile	95%ile	5%ile	50%ile	70%ile	95%ile	5%ile	50%ile	70%ile	95%ile
Baseline	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.031	0.045	0.050	0.064	0.032	0.045	0.051	0.064	0.033	0.047	0.052	0.063
2020	0.059	0.086	0.096	0.120	0.061	0.086	0.096	0.120	0.066	0.093	0.102	0.122
2050	0.148	0.218	0.245	0.313	0.163	0.234	0.264	0.334	0.192	0.276	0.306	0.382
2075	0.209	0.322	0.367	0.489	0.253	0.377	0.428	0.559	0.334	0.492	0.549	0.708
2100	0.259	0.419	0.483	0.679	0.337	0.519	0.595	0.806	0.497	0.750	0.843	1.120

Coastal Location (latitude(N), longitude(E)):* 51.61, -5.08

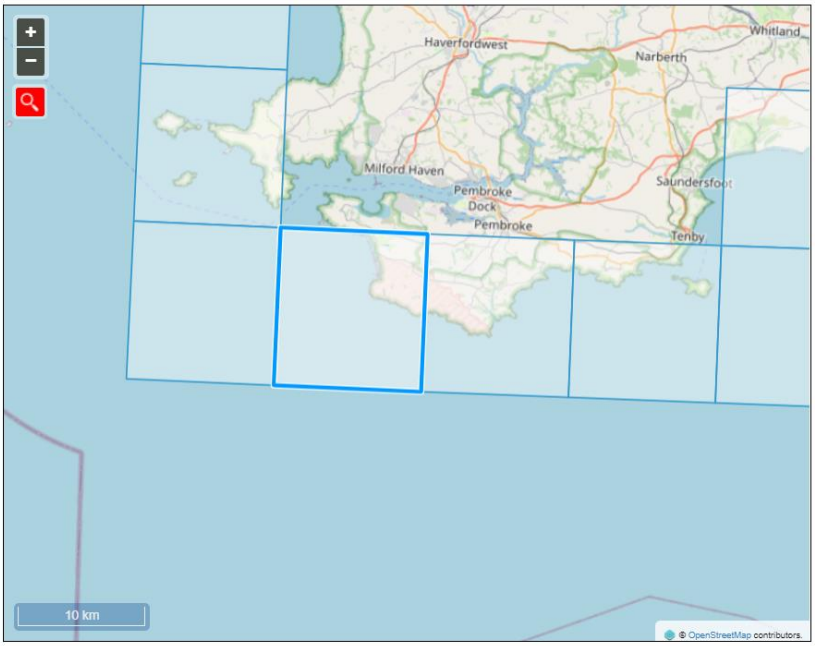


Plate 5.4 Location of CFB output point used in Table 5.7.

5.1.3.7 Seabed Geology, Geomorphology and Sediment Distribution

The seabed occupied by the Project Area is relatively flat, although there is large sand wave field to its east, with sand waves (north-south oriented crests, 12-14 m high, and 1-1.5 km in wavelength) migrating to the west (James, 2008). Between the southern boundary of the Project Area and Castlemartin Peninsula is a shallower area of seabed occupied by Saint Gowan Shoals.

Within the offshore PDZ area, the seabed sediments are mainly featureless and composed of a relatively thin layer of sand (less than 0.5 m), with some gravelly sand resting on Jurassic mudstone and limestone bedrock (as shown in Tappin, 1983a, 1983b). The export cable routes for all six landfalls cross an area of relatively flat seabed characterised by a thin layer of Gravelly sand (less than 0.5 m), resting on Carboniferous mudstones and sandstones. The proposed landfall location of Bullslaughter Bay lies close to the eastern side of Saint Gowan Shoals.

5.1.3.8 Seabed Bedload Sediment and Transport

Halcrow (2012) indicated that the net sediment transport pathway across the offshore PDZ area and the export cable corridor is from west to east (shown in Halcrow, 2012). However, migration of sand waves located east of the PDZ suggests transport to the west (James, 2008). Tidal currents are the main driving force of sediment transport in the offshore areas.

5.1.3.9 Suspended Sediment

To inform the baseline for the Atlantic Array OWF, regional-scale assessments of the suspended sediment concentration were consulted that use satellite remotely-sensed images calibrated against six SmartBuoys around the UK (Dolphin et al., 2011). Values interpreted from the turbidity map for the Outer Bristol Channel, show the suspended sediment concentration to range from 30 mg/l during the summer months to 50 mg/l during winter months. This was considered to be broadly consistent with the data collected during the Atlantic Array specific metocean survey (collected between January and April 2011). The latter

data set revealed a general suspended sediment concentration of between 10 and 50 mg/l, with peaks of up to 280 mg/l (RWE, 2013). Concentrations of suspended sediments in the Project Area therefore can vary.

5.1.3.10 Shoreline Geology and Geomorphology

The geology of the south-southwest facing and west-facing coasts of Pembrokeshire (Castlemartin Peninsula) is dominated by limestone, sandstone and mudstone bedrock ranging in age from Ordovician to Carboniferous. This geology is the main control on the large-scale evolution of the coast, dominated by high plunging cliffs and shore platforms, with only intermittent accumulations of sediment (beaches and dune systems) within a number of shallow bays. These include the pocket beach at the head of Bullslaughter Bay characterised by a thin veneer of sand overlying shore platform, the 1.3 km long beach at Freshwater West, and its associated sand dunes of Broomhill Burrows. The shallow bays have likely formed due to differential erosion of local variations in geology. The coast contains a series of caves, stacks, arches, blowholes and geos (deep steep-sided and narrow inlets in rocky coasts) which have developed due to erosion along relatively weak joints, faults and fissures in the limestone (May, 2007).

The dunes at Broomhill were formed by the prevailing onshore winds blowing sand inland. Cliff erosion rates along Castlemartin Peninsula are low because the limestone and sandstone is resistant to wave attack. Different rates of erosion result from local variations in cliff type and structure. Halcrow (2012) suggested that there is the potential for several metres of erosion locally as a result of isolated cliff falls. Halcrow (2002) classified these cliffs as ‘low erosion’ (between 0.1 m/year and 0.5 m/year), with the potential for small (less than 10 m recession) cliff failure events, occurring every 10-100 years. Any material eroded from the cliffs would accumulate as debris at the toe of the cliffs where it would be gradually removed by waves. The pocket beach in Bullslaughter Bay is protected by cliffed headlands to either side, and accumulations of rounded pebbles and cobbles are present at the toe of the cliffs landward of the sand beach.

5.1.3.11 Shoreline Bedload Sediment and Transport

The open coast of south Pembrokeshire, which encompasses all six landfalls, is sediment-limited confined to short stretches within indented bays. According to Halcrow (2012) there is poor sediment connectivity between the bays; they are largely self-contained and act as local sediment sinks. The pocket beach at Bullslaughter Bay has remained generally stable, with little input or loss of sediment. Sand and shingle inputs to the coast are local to landslides and rock falls. However, Halcrow (2002) suggested that a small supply of sand from offshore feeds the dunes at Freshwater West.

Longshore sediment transport rates and directions vary along the open coast due to changing orientation and exposure to the dominant southwesterly swell waves. Transport is also hindered by the numerous limestone headlands which act as barriers to movement. Where longshore transport does occur, it is generally to the east along west-east oriented coasts and to the south on northsouth oriented coasts (Halcrow, 2012).

5.1.4 Potential Impacts

The summary of key sensitivities and potential impacts for marine coastal processes is presented in Table 5.8. The following paragraphs provide more general discussion points.

The Project design, consisting of the MOS platform (that is independent from the offshore power generation development project itself) and buried cables means that the potential impacts on marine coastal processes from the Project are limited.

In terms of potential 'footprint' and 'blockage' impacts during the operational phase, there will be foundations for the MOS platform within the water column. Due to this, there is limited potential for the project to affect the physical processes (waves and tidal currents) or, though changes to these processes, affect the sediment transport regimes.

There is, however, potential to affect the sea bed due to installation of cables, including at the cable landfall, with increased suspended sediment concentrations within plumes (and associated consequences upon water quality), rock armour to protect surface laid cables and mattresses used at cable crossings.

Table 5.8 Summary of Key Sensitivities and Potential Impacts for Marine Coastal Processes

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Sedimentary and morphological regime	Potential for enhanced concentrations of suspended sediments, and subsequent sediment deposition arising from disturbance of the seabed.	Yes	Potential effect on suspended sediment concentrations during construction. Given the limited scope of the Project, expert judgement of potential impacts, rather than numerical modelling, is likely the most proportionate approach. The final approach will be determined through consultation with NRW.
Hydrodynamic regime	Changes to the baseline tidal, and wave regimes due to the presence of installation vessels.	No	Vessel presence is not expected to materially affect hydrodynamic regimes.
Sedimentary and morphological regime	Changes to the baseline sedimentary and morphological regimes due to the presence of installation vessels.	No	Vessel presence is not expected to materially affect sedimentary and morphological regimes.
Coastal geological designated sites	Physical disturbance to geological features of interest	Yes	Landfall construction works and offshore cable trenching may have an effect on geological designated sites.
Coastal morphology	Changes to the coast as a result of landfall works	Yes	In line with the Welsh Marine Plan, the risk of 'coastal change' should be assessed and minimised.
Operational Phase			
Seabed morphology	Changes to the seabed morphology due to the physical footprint	Yes	Footprint of the foundations/ cable protection measures will impact directly on the sea bed
Hydrodynamic regime	Changes to the baseline tidal, and wave regimes due to the presence of obstructions on the sea bed and/or in the water column.	Yes	Cable protection measures on the sea bed and jacket foundations of substations in the water column will cause localised changes in tidal and potentially wave regimes.
Sedimentary and morphological regime	Changes to the baseline sedimentary and morphological regimes due to the presence of obstructions on the sea bed and/or in the water column.	Yes	Any changes to the baseline tidal, and wave regimes may cause knock-on effects on the baseline sedimentary and morphological regime, or such effects may arise directly due to 'blockage'.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Decommissioning Phase			
Sediment Transport	During decommissioning works there is potential for increased concentrations of suspended sediments, and subsequent sediment deposition arising from disturbance of the seabed.	Yes	Potential effect on suspended sediment concentrations during construction. Can be inferred from assessment of construction phase effect.
Hydrodynamic regime	Changes to the baseline tidal, and wave regimes due to the presence of decommissioning vessels.	No	Vessel presence is not expected to materially affect hydrodynamic regimes.
Sedimentary and morphological regime	Changes to the baseline sedimentary and morphological regimes due to the presence of decommissioning vessels.	No	Vessel presence is not expected to materially affect sedimentary and morphological regimes.
Coastal geological designated sites	Physical disturbance to geological features of interest	Yes	Landfall construction works and offshore cable trenching may have an effect on geological designated sites.
Coastal morphology	Changes to the coast as a result of landfall decommissioning works	Yes	In line with the Welsh Marine Plan, the risk of 'coastal change' should be assessed and minimised.
Cumulative Impacts are scoped in for this receptor topic			

5.1.5 Potential Mitigation

Potential mitigation measures for the onshore cable construction works include avoidance of impact through engineering techniques (e.g. trenchless techniques at sensitive points).

It is expected that any impacts on the offshore physical and sedimentary processes will be small scale, localised and temporary. Therefore, there are no additional mitigation measures expected.

5.1.6 Environmental Assessment Approach

A desk-based description of the baseline environment will be produced in relation to sediment transport (including baseline suspended sediment concentrations), and to characterise the bathymetry and sediment composition of the sea bed (including inter-tidal shore) within the corridor of the export cable (and at its landfall). Given the limited footprint of the MOS platform, it is not anticipated to be necessary to capture wave data within the offshore PDZ area for purposes of environmental assessment, but if otherwise collected for design of the jacket foundations of the sub-station(s), it would also usefully contribute to the baseline description of the wave regime.

It will be necessary to capture topography data at the intertidal section of the chosen landfall (and if this is the Freshwater West landfall then repeat surveys may be needed to characterise fluctuations over time). This will allow a robust baseline for shoreline bedload and sediment transport to be generated.

Due to the temporary (short-duration) and reversible nature of increases in suspended sediment arising from cable laying, it is proposed that an expert geomorphological assessment, drawing from evidence

from other published sources (such as research findings from marine aggregate extraction publications) will provide a proportionate assessment of the impact.

5.2 Marine Sediment and Water Quality

As discussed in Section 3.2.1, the Welsh National Marine Plan has been published and this includes the following policy of relevance to the Marine water and Sediment Quality assessment for the PDZ:

Policy SOC_03, Marine pollution incidents –

"*Proposals should demonstrate how they minimise their risk of causing or contributing to marine pollution incidents.*"

5.2.1 Data and Information Sources

Baseline data used to inform this topic includes:

- Information provided in Section 5.1 (Marine Coastal Processes);
- Literature and reports available for the nearby area (for example the Environmental Statement for Project Erebus (Blue Gem Wind, 2021);
- Water Framework Directive (WFD) (NRW, 2022), Water Watch Wales, WFD Cycle 3 (2021)

Wales Marine Planning Interactive Viewer accessed June 2022.

5.2.2 Study Area

The Study Area for this topic is the same as that identified in Section 5.1 (Marine Coastal Processes), the South West Pembrokeshire coast and the immediate marine areas of the northwest Bristol Channel, (Figure 2.1).

5.2.3 Existing Environment

Sediment Quality

As described in Section 5.1 (Marine Coastal Processes), sediments within the Project Area are mainly composed of a relatively thin layer (less than 0.5 m) of sand with some gravelly sand resting on Jurassic mudstone and limestone bedrock, also see Section 5.3 (Onshore Geology, Geomorphology and Soils).

The export cable routes for all six landfalls cross an area of relatively flat seabed characterised by a thin layer of gravelly sand (again less than 0.5 m), resting on Carboniferous mudstones and sandstones. The proposed landfall location of Bullslaughter Bay lies close to the eastern side of Saint Gowan Shoals. The seabed sediment at the proposed landfall location of Freshwater West and Freshwater East is sand.

As a result of the nature of the sediments being coarser grained, significant levels of seabed contamination are not anticipated since these are generally associated with finer grain sizes (silt and clay) with high levels of organic matter. This is supported by the information collected to inform the environmental studies for the Atlantic Array OWF (RWE, 2013) and Project Erebus (Blue Gem Wind, 2021)). Similar sediment properties to those anticipated within the Project Area were identified although muddier sediments were located to the north of the survey area, along the northern Atlantic Array OWF site boundary extending into the centre of the site, as well as to the east and west of Lundy and in the inshore sections of the export cable route corridors. Since chemical contaminants are more likely to be found in the smaller grain sizes, surveys to support the Atlantic Array OWF focused on areas with higher proportions of finer sediment grain sizes. Samples indicated that chemical contaminant concentrations were low and no samples exceeded the Centre for Environment, Fisheries and Aquaculture Science (Cefas) Action Level values used in the assessment for metal contamination. Total Hydrocarbon Content data also did not indicate levels of contamination above Cefas Action Level 1.

Water Quality
This section considers water quality parameters including chemistry and physio-chemical factors such as suspended solids and nutrient concentrations.

Similarly to the Atlantic Array OWF and Project Erebus sites, the absence of large quantities of fine material suggests that the seabed is not the main source of suspended sediment within the area. It is more likely that the suspended sediments are transported into the region from the Severn Estuary and other tributaries and this fluvial component is considered to be the main source of suspended sediment to the Outer Bristol Channel (RWE, 2013).

As described in Section 5.1 (Marine Coastal Processes), suspended sediment concentrations in the Outer Bristol Channel have been shown to range from 30 mg/l during the summer months to 50 mg/l during winter months, respectively and peaks of up to 280 mg/l (RWE, 2013).

There is relatively limited information regarding other water quality parameters in offshore locations. Information is however available from compliance monitoring undertaken to inform the WFD within the waterbodies surrounding the coastline (out to one nautical mile) and the Bristol Channel. Whilst the PDZ are not located within a WFD water body, the potential cable routes and landfalls may pass through the Pembrokeshire South Coastal Water body (GB611008590003) as shown in Appendix A, Figure A5.5.1. The Pembrokeshire coastal water body is at good chemical status. Pembrokeshire South Coastal Water body contains Protected Areas as shown in Appendix A, Figure A5.5.2.

5.2.4 Potential Impacts

Whilst many EIAs have been undertaken on similar projects identifying that there are only minor impacts on water quality, concern has nevertheless increased regarding the potential effects in the intervening period. Site investigation regarding the levels of contaminants within the sediments to be impacted as outlined in Section 5.2.6 will assist with addressing the potential chemical contamination concern alongside using the assessment presented in Marine Coastal Processes to inform the potential effects on suspended solid concentrations both during the construction and operational phases. A summary of the recommendations is presented in Table 5.9.

Table 5.9 Summary of Key Sensitivities and Potential Impacts for Marine Sediment and Water quality

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Water Quality (suspended solids concentrations)	Change in concentrations of suspended sediment in the water column associated with foundation and cable installation	Yes	Increasing general concern from regulators regarding the potential risk to water quality (and topics relying on water quality).
Water Quality (chemical and physical parameters such as dissolved oxygen and nutrients)	Deterioration in water quality associated with release of sediment bound contamination.	Yes	Increasing general concern from regulators regarding the potential risk to water quality (and topics relying on water quality). To address this impact, it is recommended that sediment contaminant sampling is carried out during site specific survey work.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Water Quality (chemical parameters)	There is the potential that water quality could be impacted by accidental spills and leaks during construction	No	This is not a planned impact, it is accidental. This effect therefore cannot be assessed in the same way as other impacts. Environmental management plans are designed to reduce the risk of these effects occurring and therefore commitment to producing these plans is generally sufficient justification to scope this effect out.
Operational Phase			
Water Quality (suspended solids concentrations)	Change in concentrations of suspended sediment in the water column associated with scour and cable maintenance	Yes	Increasing general concern from regulators regarding the potential risk to water quality (and topics relaying on water quality).
Water Quality (chemical and physical parameters such as dissolved oxygen and nutrients)	Deterioration in water quality associated with release of sediment bound contamination.	Yes	Increasing general concern from regulators regarding the potential risk to water quality (and topics relaying on water quality).
Water Quality (chemical parameters)	There is the potential that water quality could be impacted by accidental spills and leaks during maintenance activities	No	This is not a planned impact, it is accidental. This effect therefore cannot be assessed in the same way as other impacts. Environmental management plans are designed to reduce the risk of these effects occurring and therefore commitment to producing these plans is generally sufficient justification to scope this effect out.
Decommissioning Phase			
Water Quality (suspended solids concentrations)	Change in concentrations of suspended sediment in the water column associated with removal of structures/cables and any landfall activities	No	Very minimal seabed disturbance is anticipated and therefore likely to be the same or less than the impacts assessed for construction.
Water Quality (chemical parameters)	There is the potential that water quality could be impacted by accidental spills and leaks during decommissioning activities	No	This is not a planned impact, it is accidental. This effect therefore cannot be assessed in the same way as other impacts. Environmental management plans are designed to reduce the risk of these effects occurring and therefore commitment to producing these plans is generally sufficient justification to scope this effect out.
Cumulative Impacts are scoped out due to the limited expected extent of any impacts			

5.2.5 Potential Mitigation

To mitigate potential effects, it is proposed that the cable route selection will take into account any existing activities on the seabed that could have impacted on sediment quality, such as offshore disposal sites, and seeks to minimise the potential for water or sediment quality impacts on sensitive receptors.

There will also be compliance with a Code of Construction Practice (CoCP) and Environmental Management Plan to ensure appropriate Pollution Prevention Guidelines and best practice are followed.

No other mitigation is proposed at this stage, however, the requirement for additional mitigation may be identified once the results of the sediment contaminant sampling are available.

5.2.6 Environmental Assessment Approach

It is proposed that site specific sediment quality data will be gathered for the offshore PDZ area and the chosen offshore cable route. This data will be gathered and assessed in line with sediment quality guidelines such the Cefas Action Levels to determine the level of contamination present and therefore risk to the marine environment.

The potential impacts of suspended sediment concentrations will be informed by the conclusions of the of Marine Coastal Processes assessment.

5.3 Onshore Geology, Geomorphology and Soils

This section describes the existing onshore geomorphology and geology of the Project Area and summarises the potential effects of the Project, followed by a description of the proposed methodology to assess those effects.

This section has been prepared with reference to the following guidance:

- Land Contamination Risk Management Framework (Environment Agency, 2021) (formerly Model Procedures for the Management of Contaminated Land (CLR11) – withdrawn 2020).
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, updated 2021).
- Part 2A Statutory Guidance on Contaminated Land (National Assembly for Wales, 2006)
- Environment (Wales) Act (2016) (Welsh Government).

5.3.1 Data and Information Sources

The following sources have been reviewed to provide baseline information for the study area:

- British Geological Survey (BGS) Onshore GeoIndex web portal, accessed June 2022.
- Multi Agency Government Information for the Countryside (MAGiC) map application accessed June 2022.
- NRW Interactive Viewer accessed June 2022.

5.3.2 Pembrokeshire County Council Adopted Local Plan (2013). Study Area

The Study Area for this topic is the onshore component of the Project Area, shown in Figure 2.1.

5.3.3 Existing Environment

Geological and Geomorphological Designations

This section should be read in conjunction with Section 5.1 (Marine Coastal Processes), as the coastal geological designations in the vicinity of the landfall locations presented previously also overlap with the onshore environment.

The South West Pembrokeshire coastline and inshore area hosts a number of conservation designations with geological interests. Those that relate to onshore geology that could be in the vicinity of the selected onshore cable route include the Internationally Designated site of Limestone Coast of South West Wales SAC; Nationally Designated site of Castlemartin Range SSSI; and the Caled Quarry Regionally Important Geological Sites (RIGS). These are shown in Appendix A, Figures A6.1.1 and A6.1.2, and Table 5.10.

As potential onshore cable routes have not yet been identified, this section will consider the geological features in the vicinity of each of the proposed landfall locations and the proposed site for grid connection, Pembroke Power Station.

Due to the generally low levels / low intensity nature of previous anthropogenic activity across the Project Area it is highly unlikely that any contaminated land issues are present.

A review of the Pembrokeshire County Council Adopted Local Plan indicates that areas within the onshore study area are located within a sand and gravel resource area.

Table 5.10 Designated sites for Geology, Geomorphology and Soils in the Project Area

Name	Location to the Project	Reason for Consideration
Special Areas of Conservation		
Pembrokeshire Marine / Sir Benfro Forol	Overlapped by Project Area; northern half of the Project Area, including all shoreline within the Project Area, is within this site.	Project Area; Marine and coastal habitats; marine mammals (grey seal); migratory fish (various species); and otter.
Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru	Overlapped by Project Area; All landfall options except Greenala Point and Freshwater East landfall are within this site.	Project Area; Sea cliffs and caves; cliff top heath and grassland; dunes; early gentian; petalwort; and greater horseshoe bat.
Sites of Special Scientific Interest		
Milford Haven Waterway	Overlapped by Project Area; Pembroke Power Station is 0.5km south of the site boundary.	Project Area; Estuarine; coastal and wetland habitats and species; ancient woodland; horseshoe bats; and geology.
Broomhill Burrows	Overlapped by Project Area; Freshwater West landfall option is within the SSSI.	Project Area; Dune habitats and species; breeding chough; and geology.
Angle Peninsula Coast / Arfordir Penryhn Angle /	Overlapped by Project Area; immediately to the northwest of Freshwater West Landfall Option.	Project Area; Fish spawning areas; coastal habitats; chough & peregrine falcon; and geology.
Castlemartin Range	Overlapped by Project Area; Bullslaughter Bay and Broadhaven South landfall option is within the site.	Project Area; Coastal, cliff, maritime grassland and heath habitats and species; and geology.
Geological Conservation Review Site		
South Pembroke Cliffs	Overlapped by Project Area; Bullslaughter Bay landfall option is within this site.	Project Area; Structures formed in limestone cliffs.
Regionally Important Geological and Geomorphological Sites		
Bullslaughter Bay	Overlapped by Project Area; Bullslaughter Bay landfall option is within this site.	Project Area; Gash breccia.
Longstone Down	Overlapped by Project Area; immediately west of Bullslaughter Bay landfall option; adjoins Bullslaughter Bay RIGS.	Project Area; Karstic landforms.
Caled Quarry	Overlapped by Project Area; 1.7 km northeast of Bullslaughter Bay landfall option.	Project Area; Section through lower Carboniferous strata.

Permitted Waste Sites

Permitted waste sites within the study area include:

- Wogaston - inert landfill site (approximate Ordnance Survey Grid Reference 190760 Easting, 201136 Northing).
- Pembroke Refinery – biological treatment (sludge treatment) (approximate Ordnance Survey Grid Reference 191292 Easting, 202212 Northing).

Permitted waste sites are displayed in Appendix A, Figure A5.3.1.

Water sources

A review of available data indicates that a Source Protection Zone is not present within the onshore study area therefore it is unlikely that there are abstraction wells utilised for public potable supplies. Liaison with the local authority should be undertaken to determine if there are local potable abstractions and an environmental database search would be required to identify the presence (or absence) of groundwater abstractions relating to public supplies and for other uses such as irrigation.

5.3.4 Potential Impacts

A summary of the potential impacts of the Project on Onshore Geology, Geomorphology and Soils is provided in Table 5.11.

Table 5.11 Summary of Key Sensitivities and Potential Impacts for Onshore Geology, Geomorphology and Soils

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Geology and geomorphology	Physical disturbance to geological features of interest (including national and regionally designated sites) during substation and onshore cable route construction.	Yes	Open cut and trenchless construction methods associated with landfall, onshore cable route and substation have the potential to impact on geologically designated sites. Therefore, potential impacts to geology and geomorphology should be scoped into the assessment.
Mineral Safeguarding Areas	Loss, damage or sterilisation of mineral resources.	Yes	Sand and gravel resource areas are present within the study area. Construction activities have the potential to prevent the future extraction of identified reserves and so any potential impacts should be scoped into the EIA unless these are avoided in the site selection process.
Construction workers, current on and offsite users	Impacts on human health both on and off site from contamination sources.	Yes	Construction activities, particularly in areas that may contain potential sources of contamination, have the potential to mobilise existing sources of contamination which may represent unacceptable risks to human health. Therefore, impacts on human health should be scoped into the EIA.
Operational Phase			
Geology, geomorphology	Physical disturbance to geological features of interest (including	No	Large scale excavation works are unlikely to be required during the operational phase of the PDZ which could impact designated geological features. Therefore, potential impacts to geology and

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
	national and regionally designated sites)		geomorphology during the operational phase should be scoped out of the EIA.
Mineral Safeguarding Areas	Loss, damage or sterilisation of mineral resources.	Yes	Sand and gravel resource areas are present within the study area. The onshore infrastructure associated with the PDZ have the potential to prevent future extraction of mineral resources within the permanent infrastructure footprints (and associated easements) for the duration of the project. Therefore, potential impacts should be scoped into the EIA unless these are avoided in the site selection process.
Decommissioning Phase			
Geology, geomorphology	Physical disturbance to geological features of interest (including national and regionally designated sites)	Yes	Removal of project infrastructure has the potential to impact the geology and geomorphological features present within the onshore study area. Therefore, potential impacts during the decommissioning phase should be scoped into the EIA.
Mineral Safeguarding Areas	Loss, damage or sterilisation of mineral resources.	Yes	No additional impacts to mineral resources are anticipated during decommissioning works. The impacts to mineral resources during decommissioning works, should however, be included within the EIA (unless these are avoided in the site selection process) for this stage of the project as infrastructure left in-situ may result in the inability for resources to be extracted at a later date.
Cumulative Impacts are scoped in for this receptor group			

5.3.5 Potential Mitigation

Proposed mitigation methods are as follows:

- Avoidance of impact through engineering techniques (e.g. trenchless techniques at sensitive points).
- Compliance with a CoCP to ensure appropriate Pollution Prevention Guidelines and good practice guidelines are followed.
- Where potential sources of contamination cannot be avoided, targeted ground investigations may be required to characterise the site conditions, identify unacceptable risks to receptors and determine whether remediation is required. Should remediation be required, a remediation strategy should be developed and agreed with the relevant bodies prior to the commencement of works. The ground investigation, risk assessment and remediation should follow the guidance provided within the 2021 Environment Agency Land Contamination Risk Management Framework.
- Should any excavation works be required within 50m (or 250m dependent upon the volume abstracted) of private potable groundwater abstractions the development of a hydrogeological risk assessment may be required. The risk assessment should be undertaken prior to the commencement of construction works and meet the requirements of the Environment Agency's

Approach to Groundwater Protection 2018 Framework. Should piling be required as part of the development in areas of potential contamination, a piling risk assessment may also be required.

5.3.6 Environmental Assessment Approach

A Preliminary Risk Assessment (PRA) in relation to contaminated land will likely need to be undertaken. The PRA would be a desk-based exercise which would be undertaken to establish the existing environment in relation to onshore geology and contamination. The topics covered within the PRA would include (but are not limited to):

- Site Setting including a site walkover (as required).
- Hydrology.
- Geology and mineral resources.
- Hydrogeology, aquifer designations and groundwater sources.
- Historical land use and potential contamination sources.
- Sensitive land uses (including designated sites).

The PRA would be undertaken to develop a Preliminary Conceptual Site Model (PCSM) to aid in the identification of potential sources of ground contamination within the onshore study area. The PCSM would also identify the risk the potential sources of contamination may pose to sensitive receptors that currently exist within the onshore study area or would be introduced (e.g. via construction activity). The PRA would include the onshore study area plus a 250m buffer zone to assess for potential sources of contamination, discharge consents, pollution incidents, landfills and contemporary trade entries. Historical maps would also be reviewed up to 250m from the boundary of the onshore study area to identify potential contaminant sources in the surrounding area. Both groundwater and surface water abstraction points within a 1km buffer zone will also be assessed as part of the PRA.

The key guidance which would be used to inform the assessment would include:

- British Standard ‘Investigation of Potentially Contaminated Sites – Code of Practice’, BS EN 10175:2011 +A2:2017.
- British Standard ‘Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings’ BS8485:2015 +A1:2019.
- British Standard ‘Guidance on Investigations for Ground Gas –Permanent Gases and Volatile Organic Compounds (VOCs)’, BS 8576:2013.
- British Standard ‘Code of Practice for Ground Investigations’, BS 5930:2015+A1.
- CIRIA ‘Contaminated Land Risk Assessment – A Guide to Good Practice’, C552 (2001).
- Construction Industry Research and Information Association (CIRIA) ‘Assessing Risks Posed by Hazardous Ground Gases to Buildings’, C665 (2007).
- Department of the Environment ‘Industry Profiles for previously developed land’ (1995).
- Environment Agency ‘Approach to Groundwater Protection Position Statements’ (2018).
- Environment Agency ‘Land Contamination: Risk Management Framework (2021).
- NRW, ‘The Development of Land Affected by Contamination: A Guide for Developers’ (2017).
- Welsh Government ‘Contaminated Land Statutory Guidance’, WG19243 (2012).
- Welsh Government, ‘Environment (Wales) Act 2016 Part 1 - Sustainable Management of Natural Resources’, (2019).

The desk-based study forms the initial step in the assessment of potential contamination, as well as providing information for the design of intrusive ground investigation works that may be required in the event of the PRA identifying potentially unacceptable risks. The PRA would be progressed based on data obtained from an Environmental Database Report which incorporates historical maps, site sensitivity data, and regulatory information.

5.4 Onshore Groundwater and Hydrology

The onshore components of the Project will include a cable route, substation and grid connection. These activities have the potential to affect surface and groundwater resources through direct disturbance, changes in land use and release of contaminants.

This section describes the baseline surface water environment and groundwater conditions in the potentially affected area, and summarises the anticipated impacts of the Project. This section also provides a description of any further studies that are required to support the impact assessment.

At this stage, it is anticipated that the potential impacts on surface and groundwater resources will be assessed using a desktop study informed by the information collated and provided in Section 6.1 (Designated Sites), and Section 6.5 (Terrestrial Ecology).

5.4.1 Data and Information Sources

Baseline data used to inform this topic is as follows:

- Water Framework Directive (WFD) (NRW, 2022), Water Watch Wales, WFD Cycle 3 (2021)
- Fluvial, coastal and surface water flood and reservoir flood risk data from NRW (NRW, 2022)
- Ordnance Survey mapping and aerial photography

5.4.2 Study Area

The Study Area for this topic is the same onshore Study Area as the following Section 6.5 (Terrestrial Ecology), shown in Appendix A, Figure A6.4.1.

5.4.3 Existing Environment

Surface Streams

The Study Area is drained by a network of surface streams with small, steep calcareous catchments and narrow constrained valleys which give way to areas of wider floodplain in the coastal zone (Figure A5.5.1). These watercourses are dominated by groundwater inputs from the underlying limestone bedrock, with a large number of springs emerging from the valley sides throughout the Study Area.

The largest watercourse in the Study Area is Castlemartin Corse, which rises from a network of springs to the west of St Petrox and flows in a north-westerly direction until it meets the sea at Freshwater West (Figure A5.5.1). In the upper parts of the catchment, the river flows through a narrow, steep sided valley and narrow floodplain, where it is fed by a network of small streams which emerge from springs in the valley sides. Relief is much lower in the coastal zone, and here the river flows through a wide area of floodplain wetland behind the coastal dune system. The floodplain is drained by a network of spring-fed ditches which feed into the main river. The headwater channels are narrow, with a low to moderate sinuosity which may be indicative of historical straightening. The channel becomes more highly sinuous further downstream (between Orielton Mill and Stem Bridge), before returning to a more straightened planform between Stem Bridge and the coast.

Several smaller streams drain northwards into Angle Bay, the Pembroke River or directly into Milford Haven, and southwards into the lakes at Bosherston (Figure A5.5.1).

There are limited data available for the calcareous streams in the Study Area, but WFD classification data for Castlemartin Corse, indicates that water quality is moderate, see Section 0 (Water Framework Directive) for further information. These data indicate that dissolved oxygen levels are likely to be low,

resulting in pressures on aquatic plant and invertebrate communities. Low dissolved oxygen concentrations can occur naturally, for example due to low levels of dissolved oxygen in contributing groundwater. However, it could also be potentially indicative of low energy river flows, high concentrations of nutrients (resulting in high algal growth), high water temperature and high sediment input.

Lakes
There are several small online lakes in the Study Area, including two former millponds formed in a dammed valley near West Orielton. These drain into Castlemartin Corse at Orielton Mill. In addition, there are three flooded valleys at Bosherston, each fed by a small freshwater stream to form Lily Ponds (Figure A5.5.1).

Groundwater
The southern part of the Study Area is underlain by a bedrock Principal aquifer. The remainder of the Study Area is underlain by a Secondary A aquifer (also in the bedrock), except for an east-west band beneath lower parts of the Castlemartin Corse catchment which is designated as a Secondary B aquifer.

There are no superficial deposits which support aquifers in the Study Area.

Limited data on groundwater quality are available, but WFD classification data for the Pembrokeshire Carboniferous Limestone water body indicates that water quality and availability is both good, see Section 0 (Water Framework Directive).

Flood Risk
Data from NRW indicates that flood risk from fluvial and coastal flooding is generally low, and confined to the narrow valley floors adjacent to the surface watercourses. Surface water flood risk (i.e. due to surface runoff) is also typically low, and limited to the valley floors. The floodplain downstream of the lakes at West Orielton and Bosherston could also potentially be affected by reservoir overtopping.

5.4.4 Potential Impacts

A summary of the potential impacts of the Project on Onshore Groundwater and Hydrology is provided in Table 5.12.

Table 5.12 Summary of Key Sensitivities and Potential Impacts for Onshore Groundwater and Hydrology

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Surface watercourses crossed by cable route	Direct impacts on the hydrology and geomorphology of surface watercourses by the installation of the cable infrastructure	Yes	Increasing concern from regulators with regards to the geomorphological impacts of open trench crossings of surface watercourses
Surface watercourses with construction activities within catchment	Increase in the supply of fine sediment to surface watercourses during construction of onshore infrastructure	Yes	Likely concern from regulators regarding geomorphological impacts of sediment supply from excavations and watercourse crossings
All surface watercourses and groundwater	Accidental release of contaminants to surface waters and groundwater during	Yes (in situ contamination only)	This includes disturbance of in situ nutrients and contaminants, and the accidental release of foul water or contaminants from construction

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
	construction of onshore infrastructure		materials and machinery. The latter should be scoped out on the basis of best practice pollution prevention and control measures
All surface watercourses and groundwater	Increased runoff and altered subsurface flows; earthworks during construction have the potential to alter surface water flows, drainage patterns and increase surface water runoff	Yes	Potential for changes to surface and subsurface flows, and by extension flood risk, as a result of onshore construction activities
All surface watercourses and groundwater	Changes to flood risk during construction	Yes	Changes to flood risk should be explored in detail in a Flood Consequence Assessment and summarised in the EIA
Operational Phase			
All surface watercourses and groundwater	Accidental release of contaminants to surface waters and groundwater	No	Scope out on the basis that onshore maintenance would be limited and that best practice pollution prevention and control measures would be adhered to
All surface watercourses and groundwater	Increased runoff and altered subsurface flows	Yes	Potential for changes to surface and subsurface flows, and by extension flood risk, as a result of onshore operational infrastructure
All surface watercourses and groundwater	Changes to flood risk as a result of the presence of operational infrastructure	Yes	Flood risk was included implicitly in the impact above, but not clearly referenced. Changes to flood risk should be explored in detail in a Flood Consequence Assessment and summarised in the EIA
All surface watercourses crossed by onshore infrastructure	Direct impacts on the hydrology and geomorphology of surface watercourses due to the permanent presence of cable infrastructure at crossing points	Yes	Increasing concern from regulators with regards to the geomorphological impacts of open trench crossings of surface watercourses, including long-term effects on reach stability and constraints on natural adjustment
Decommissioning Phase			
Impacts considered to be similar and no worse than those described for the construction phase			
Cumulative Impacts are scoped in for this receptor group			

5.4.5 Potential Mitigation

The potential mitigation proposed is as follows:

- Take measures to prevent direct impacts on the hydrology and geomorphology of surface watercourses during cable installation, including maintaining flow across temporary dams through pumping, fluming or diversion channels, ensuring temporary culverts have sufficient capacity to convey water and sediment, installing the cable ducting below the active bed of the watercourse, reinstating gravel substrates and reinstating a natural bed and bank profile;

- Take measures to prevent the supply of fine sediment to the surface drainage network, including the use of silt curtains, silt traps and settlement ponds as part of the construction drainage system, covering material stockpiles and minimising the area of ground left bare at any one time;
- Take measures to prevent the release of contaminants into surface waters and groundwater, including the use of spill kits, drip trays, bunded storage tanks and dedicated impermeable refuelling areas; and
- Take measures to prevent increases in surface runoff, including the use of impermeable surfaces and SuDS at permanent development sites, restricting runoff to the greenfield rate, and incorporating soakaways and ponds in the construction stage and permanent drainage systems.
- Explore the use of trenchless crossing techniques to minimise the potential for impact on surface watercourse crossings.
- Ensure that all cable infrastructure is buried at sufficient depth beneath the bed and banks of the watercourse to avoid exposure and prevent it becoming a constraint to natural geomorphological processes.

5.4.6 Environmental Assessment Approach

Desktop based assessment

A detailed desk based assessment will be used to verify potential surface water and groundwater receptors, based on the potential for hydrological connectivity with the proposed development activities. The results of the desk-based assessment will be used as the basis for all subsequent stages of the EIA, and will also be used to inform the separate WFD compliance assessment and a detailed Flood Risk Consequence Assessment, see Section 0 (Water Framework Directive).

Field-based data collection

It is proposed that a targeted geomorphological walkover survey is undertaken to characterise the baseline surface water conditions at each proposed watercourse crossing point, and any other watercourses where there is a high potential for impact (e.g. adjacent to substations and construction compounds).

No further field-based data collection is envisaged at this stage, although it may be necessary to undertake monitoring of groundwater levels and quality if the potential for significant impacts is identified and no third-party data are available Table 5.13.

Table 5.13 Proposed Additional Data Collection for Onshore Groundwater and Hydrology

Data requirement	Method	Purpose/Rationale
A detailed desktop based assessment	WFD river water body outlines, which represent discrete catchments (or subcatchments) for surface hydrology. A detailed representation of the surface drainage network, and detailed aquifer mapping.	To verify potential surface water and groundwater receptors, based on the potential for hydrological connectivity with the proposed development activities. Any activities undertaken within these catchments have the theoretical potential to impact upon water receptors within the catchment area. Identify groundwater receptors and individual surface water receptors within each catchment that could potentially be affected by the proposed development.

Data requirement	Method	Purpose/Rationale
Geomorphological walkover survey undertaken to characterise the baseline surface water conditions at each proposed watercourse crossing point, and any other watercourses where there is a high potential for impact.	Geomorphological walkover survey.	These surveys will consider a variety of factors that are necessary to characterise the baseline geomorphology, including: Flow conditions, including dominant flow types and the degree of variability within each reach. Channel form, including planform, width and depth variation, bank form and condition, substrate types and the type and presence of bed forms such as pools, riffles and bars. Floodplain characteristics, including connectivity to the river channel, and the structure of the riparian zone. Evidence of channel modification, including enlargement and re-sectioning, artificial bank protection, embankments and in-channel structures.

5.5 Water Framework Directive assessment

The Water Framework Directive (2000/60/EC) (WFD) establishes a legal framework to protect and restore clean water across Europe to ensure long-term, sustainable use. It applies to all waters, including rivers, lakes, transitional and coastal water (out to one nautical mile from the baseline from which territorial waters are drawn) and groundwater. The WFD is implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

One of the aims of the WFD is to ensure that all European water bodies are of Good Ecological Status or Potential (for 'heavily modified' and 'artificial' water bodies) for water chemistry, biological and hydromorphological quality parameters. NRW (the competent authority for WFD in Wales) also seeks to ensure that there is no deterioration within a WFD water body as a result of any activity.

The way in which WFD impacts are assessed is different to the approach conventionally used within the EIA process. The standard EIA approach assesses whether an impact is minor, moderate or major, and whether it is beneficial or adverse. This is not compatible with the requirements of the WFD, which requires an assessment of whether a scheme (or element of a scheme) is compliant or non-compliant with various environmental objectives of the WFD. This assessment will therefore consider whether there is potential for the Project to cause deterioration in the status of river, lake, transitional, coastal and groundwater bodies in the Study Area.

5.5.1 Data and Information Sources

Baseline data used to inform this topic is as follows:

- Water Framework Directive (WFD) (NRW, 2022), Water Watch Wales, WFD Cycle 3 (2021)

5.5.2 Study Area

The Study Area for this topic is the same onshore Study Area as the following Section 6.5 (Terrestrial Ecology), shown in Appendix A, Figure A6.4.1.

5.5.3 Existing Environment

Transitional and Coastal Water Bodies

The offshore PDZ area is not located within or near to a WFD water body. Therefore activities do not require consideration against WFD compliance parameters. However, the potential cable routes and landfalls may pass through or close to the Pembrokeshire South coastal water body (which is at Good Ecological status) as shown in Figure A5.5.1.

River and lake water bodies

The potential cable routes and landfalls could pass through or close to the catchments of the following river and lake water bodies, as shown in Figure A5.5.1:

- Castlemartin Corse river water body (GB110061025000). This is at Moderate Ecological status due to low dissolved oxygen concentrations and lack of mitigation measures;
- Bosherston Lily Ponds (Eastern Arm) lake water body (GB31047013). This is at Poor Ecological Status due to pressures on macrophytes;
- Bosherston Lily Ponds (Central Arm) lake waterbody (GB31047014), which is at Moderate Ecological Status due to high total nitrogen concentrations; and
- Bosherston Lily Ponds (Western Arm and Central) lake water body (GB31047015), which is at Good Ecological Status.

Groundwater bodies
The potential cable routes and landfalls could pass through the Pembrokeshire Carboniferous Limestone groundwater body (GB41002G206000). This is at Good Chemical Status and Good Quantitative Status. This is shown in Figure A5.5.1:

5.5.4 Potential Impacts

The proposed offshore and onshore components of the Project have the potential to impact upon the status of the coastal, transitional, river, lake and groundwater bodies described during the construction, operation and decommissioning phases.

Impacts that could potentially affect the quality elements of these water bodies and result in noncompliance with the requirements of the WFD are presented in Table 5.14.

Table 5.14 Summary of Key Sensitivities and Potential Impacts for Water Framework Directive

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Direct disturbance of the seabed, resuspension of fine sediment and accidental release of contaminants	Yes	This has been highlighted as an area of concern in the context of habitat losses due to trenching, installation of rock armour and cable mattresses, and the suspension of sediment
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Changes to baseline tidal flows, wave patterns and fish migration as a result of indirect impacts during construction	Yes	This has been highlighted as an area of concern in the context of indirect effects on tidal currents, wave patterns, sediment transport pathways and migratory fish
Biology, hydromorphology and physico-chemistry of river and lake water bodies	Direct disturbance to surface watercourses, increases in sediment supply, the accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	Yes	A full assessment of all potential impact pathways will be undertaken in line with NRW guidance
Chemical and quantitative status of groundwater bodies	The accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	Yes	A full assessment of all potential impact pathways will be undertaken in line with NRW guidance
Operational Phase			
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Changes to tidal flows, wave patterns and fish migration as a result of indirect impacts during construction	Yes	This has been highlighted as an area of concern in the context of indirect effects on tidal currents, wave patterns, sediment transport pathways and migratory fish

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Direct disturbance of the seabed due to the presence of operational infrastructure	Yes	This has been highlighted as an area of concern in the context of permanent changes to hydromorphology and biology
Biology, hydromorphology and physico-chemistry of river and lake water bodies	Direct disturbance to surface watercourses, increases in sediment supply, the accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	Yes	A full assessment of all potential impact pathways will be undertaken in line with NRW guidance
Chemical and quantitative status of groundwater bodies	The accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	Yes	A full assessment of all potential impact pathways will be undertaken in line with NRW guidance
Decommissioning Phase			
Impacts considered to be similar and no worse than those described for the construction phase			
Cumulative Impacts are scoped in for this receptor group			

5.5.5 Potential Mitigation

The mitigation measures suggested for related topics (Marine Coastal Processes (Section 5.1), Marine Seabed and Water Quality (Section 5.2), Onshore Geology, Geomorphology and Soil (Section 5.3), Onshore Groundwater and Hydrology (Section 5.4), Benthic Subtidal and Intertidal Ecology (Section 6.2), and Fish and Shellfish Ecology (Section 6.3)) will feed into mitigation for the WFD. No further mitigation requirements have been identified at this stage

5.5.6 Environmental Assessment Approach

The EIA Report will provide greater detail on the proposed compliance assessment methodology, including reference to the NRW (2022) guidance on assessing WFD compliance. This should include a screening assessment that identifies whether any effects associated with the Project are temporary or non-temporary (i.e. whether they will last for a duration of greater than 6 years), and a detailed compliance assessment for any non-temporary effects.

A desk-based assessment will be undertaken to support the WFD compliance assessment, informed by information collated from related environmental topics, including Marine Coastal Processes, Marine Seabed and Water Quality, Onshore Geology, Geomorphology and Soil, Onshore Groundwater and Hydrology, Designated Sites, Benthic Subtidal and Intertidal Ecology, Fish and Shellfish Ecology and Terrestrial Ecology.

6 The Biological Environment

6.1 Designated Sites

Following the UK's exit from the EU, SACs and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network. The 2019 Regulations (amendments to the Conservation of Habitats and Species Regulations 2017) have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes:

- existing SACs and SPAs
- new SACs and SPAs designated under these Regulations.

Any references to Natura 2000 in the 2017 Regulations and in guidance now apply to the new national site network. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant. The obligations of a competent authority in the 2017 Regulations for the protection of sites or species do not change.

Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the national site network. Many Ramsar sites overlap with SACs and SPAs, and may be designated for the same or different species and habitats. All Ramsar sites remain protected in the same way as SACs and SPAs.

In addition, as discussed in Section 3.2.1, the Welsh National Marine Plan has been published and this includes the following policy of relevance to designated sites:

Policy ENV_02, Marine Protected Areas –

"Proposals should demonstrate how they:
• avoid adverse impacts on individual Marine Protected Areas (MPAs) and the coherence of the network as a whole;
• have regard to the measures to manage MPAs; and
• avoid adverse impacts on designated sites that are not part of the MPA network."

Policy 10 of the Pembrokeshire Coast National Park Authority Local Development Plan 2 states that in terms of Sites and Species of European Importance:

"(1) Development likely to have a significant effect on a European Site, when considered alone or in combination with other projects or plans will only be permitted where:
a) The proposal is directly connected with or necessary for the protection, enhancement and positive management of the site for conservation purposes; or
b) Following an appropriate assessment the proposal will not adversely affect the integrity of the site; or
c) there is no alternative solution and there are reasons of overriding public interest and appropriate compensatory measures are secured.
(2) Development likely to have an adverse effect on a European protected species will only be permitted where:
a) there are reasons of overriding public interest;
b) there is no satisfactory alternative; and
c) the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their nature range."

6.1.1 Data and Information Sources

Internationally and nationally designated sites were identified using the MAGIC online geographical information system (MAGIC, 2022). Local Nature Reserves and SINCS / Wildlife Sites were identified by reviewing the Wildlife Trust of South & West Wales website, the Royal Society for the Protection of Birds (RSPB) website and consultation with the Pembrokeshire Nature Partnership. Geological designated sites not classified as SSSIs were identified from supplementary planning guidance (PCNPA, 2022) and the Geological Conservation Review (May, 2007). No Local Nature Reserves, SINCs or Wildlife Sites were identified.

6.1.2 Study Area

Protected sites that could be affected include those with which the Project Area overlaps that could be directly affected by temporary or permanent works for the Project; those located further afield that could be indirectly affected through works in the Project Area causing physical changes to the environment that may extend beyond the boundaries of the Project Area; and, those affected indirectly via mobile species that are part of protected site populations utilising habitats in or moving through the Project Area. Consequently, several Study Areas were therefore established for various ecological receptors that encompassed all of these scenarios.

Terrestrial Protected Sites Within and Nearby the Project Area
The Terrestrial Protected Sites Study Area comprises the Castlemartin Peninsula as far as 5 km east of the Freshwater East landfall option. This includes all areas of the terrestrial environment that have potential to be directly affected by installation of cables at the landfall sites and onshore cables to Pembroke Power Station, allowing for both buried and overhead cables from all six landfall options. The Study Area extends 5 km east of the Freshwater East landfall option to capture potential indirect effects on mobile terrestrial species such as bats. If Freshwater East is selected as the preferred landfall option, a larger Study Area may need to be used for the future EIA and HRA to ensure all potential effects on mobile species that are part of protected site populations are considered.

Marine and Coastal Protected Sites Within and Nearby the Project Area
The Marine and Coastal Protected Sites Study Area for sites that could be directly affected by the Project, plus a buffer zone to account for potential indirect effects, such as mobilising sediments, extends 5 km around the Project Area. This is considered precautionary, as measurable changes in suspended sediment and sedimentation are not expected to extend as far as 5 km. The area within which there could be indirect effects will be refined following more detailed studies as part of a future EIA.

Marine Protected sites with Mobile Interest features
A Marine Protected Sites with Mobile Interest Features Study Area of 100 km extending from the Project Area was used to identify sites that are designated for marine mammals and sea turtles; birds; and migratory (catadromous, anadromous) fish. This is to account for (a) typical foraging ranges by animals and birds that are part of designated site populations, (b) the movement of migratory fish through the PDZ Project Area that are part of designated site populations; and, (c) movement of migratory birds through the PDZ Project Area that are part of designated site populations.

An expanded Study Area was also used to search for sites that support breeding bird species such as gannet and Manx shearwater, which may forage over distances ranging from 230 km to 300 km from their breeding colonies (Thaxter et al., 2012).

There are a number of SPAs designated for wintering bird species that are outside the 100 km Study Area, e.g. Cardigan Bay. These sites have not been considered further on the basis of there being no functional linkage between the Project Area and the SPA interest features.

6.1.3 Existing Environment

Designated sites considered within the Scoping Assessment are listed in Table 6.1 and shown in Appendix A, Figures A6.1.1 to A6.1.6.

Table 6.1 Designated Sites Considered in the Scoping Assessment

Name	Location to the Project	Reason for Consideration
Special Areas of Conservation		
Bristol Channel Approaches / Dynesfeydd Môr Hafren	Overlapped by Project Area; eastern third of PDZ site is within the SAC.	Marine mammals (within Project Area and designated for harbour porpoise).
West Wales Marine / Gorllewin Cymru Forol	Overlapped by Project Area; site boundary is 3.5 km north of offshore PDZ area.	Project Area; and designated for marine mammals (harbour porpoise).
Pembrokeshire Bat Sites and Bosherton Lakes / Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton	Overlapped by Project Area; units at Bosherton Lakes and Stackpole, 2.5 km east of Bullslaughter Bay landfall site; and, Orielton Stable Block and Cellars, 5 km north of Bullslaughter Bay landfall site.	Project Area; and designated for Greater and lesser horseshoe bats; and otter.
Pembrokeshire Marine / Sir Benfro Forol	Overlapped by Project Area; northern half of the Project Area, including all shoreline within the Project Area, is within this site.	Project Area; Marine and coastal habitats; marine mammals (grey seal); migratory fish (various species); and otter.
Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru	Overlapped by Project Area; Bullslaughter Bay and Freshwater West landfall options are within this site.	Project Area; Sea cliffs and caves; cliff top heath and grassland; dunes; early gentian; petalwort; and greater horseshoe bat.
Cleddau Rivers/ Afonydd Cleddau	Downstream extent ~5km north of the Terrestrial Protected Sites Study Area, where it joins Milford Haven waterway, part of Pembrokeshire Marine SAC.	Migratory fish (various species); otter.
Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd	9 km northeast of Project Area.	Migratory fish (various species); otter.
Lundy	25 km southeast of Project Area.	Marine mammals (grey seal).

Name	Location to the Project	Reason for Consideration
Cardigan Bay	43 km north of Project Area.	Marine mammals; (bottlenose dolphin, grey seal); and migratory fish (lamprey species).
River Tywi / Afon Tywi	44 km north-northeast of Project Area.	Migratory fish (various species); otter.
River Teifi / Afon Teifi	44 km east-northeast of Project Area.	Migratory fish (various species).
Llyn Peninsula and the Sarnau / Pen Llyn a`r Sarnau	90 km north north-east of Project Area.	Marine mammals; (bottlenose dolphin, grey seal); and otter.
Saltee Islands	97 km northwest of Project Area.	Marine mammals (grey seal).
Severn Estuary / Môr Hafren	115 km east of Project Area.	Migratory fish (various species).
River Wye / Afon Gwy	125 km east of Project Area.	Migratory fish (various species).
River Usk / Afon Wysg	147 km east of Project Area.	Migratory fish (various species).
Special Protection Areas		
Skomer, Skokholm and the Seas off Pembrokeshire	Overlapped by Project Area; the SPA includes marine areas off the south coast of the Castlemartin Peninsula.	Project Area; Breeding seabirds (various species); and breeding coastal birds (chough).
Castlemartin Coast	Overlapped by Project Area; Freshwater West, New Quay Beach, Broadhaven South and Bullslaughter Bay landfall option is within the site.	Project Area; Breeding coastal birds (chough).
Grassholm	13 km west of Project Area; 33 km northwest of offshore PDZ area.	Breeding seabirds (gannet).
Carmarthen Bay / Bae Caerfyrddin	15 km east of Project Area; 30 km northeast of offshore PDZ area.	Wintering water birds (common scoter).
Ramsay and St David's Peninsula Coast	20 km north of Project Area; 45 km north of offshore PDZ area.	Breeding coastal birds (chough).
Burry Inlet	41 km east of Project Area; 50 km northeast of offshore PDZ area.	Wintering water birds (various species).
Northern Cardigan Bay / Gogledd Bae Ceredigion	88 km northeast of Project Area; 115 km northeast of offshore PDZ area.	Wintering water birds (red-throated diver).
Lady's Island Lake	93 km northwest of Project Area; 113 km northwest of offshore PDZ area.	Breeding seabirds (various species); wintering seabirds; and water birds (various species).
Tacumshin Lake	97 km northwest of Project Area; 117 km northwest of offshore PDZ area.	Wintering water birds (various species); and breeding birds (various species).

Name	Location to the Project	Reason for Consideration
Saltee Islands	103 km northwest of Project Area; 119 km northeast of offshore PDZ area.	Breeding seabirds (various species).
Aberdaron Coast and Bardsey Island	106 km north of Project Area; 135 km north of offshore PDZ area.	Breeding seabirds (Manx shearwater).
Severn Estuary/ Môr Hafren	115 km east of Project Area	Wintering / migratory water birds (various species).
Ramsar Sites		
Burry Inlet	38 km east-northeast of Project Area; 50 km east-northeast of offshore PDZ area.	Wintering / migratory water birds (various species).
Cors Caron	88 km northeast of Project Area; 112 km northeast of offshore PDZ area.	Wintering water birds (whooper swan).
Severn Estuary	115 km east of Project Area.	Migratory fish (various species); wintering / on-passage water birds (various species).
Sites of Special Scientific Interest		
Milford Haven Waterway	Overlapped by Project Area; Pembroke Power Station is 0.5km south of the site boundary.	Project Area; Estuarine; coastal and wetland habitats and species; ancient woodland; horseshoe bats; and geology.
Broomhill Burrows	Overlapped by Project Area; Freshwater West landfall option is within the SSSI.	Project Area; Dune habitats and species; breeding chough; and geology.
Angle Peninsula Coast / Arfordir Penryhn Angle /	Overlapped by Project Area; immediately to the northwest of Freshwater West Landfall Option.	Project Area; Fish spawning areas; coastal habitats; chough & peregrine falcon; and geology.
Castlemartin Range	Overlapped by Project Area; Bullslaughter Bay and New Quay Beach landfall option is within the site.	Project Area; Coastal, cliff, maritime grassland and heath habitats and species; and geology.
Gweunydd Somerton Meadows	Overlapped by Project Area; 1.5 km south of Pembroke Power Station.	Project Area; Grassland fungi; and neutral grassland.
Castlemartin Corse	Overlapped by Project Area; 1.8 km southeast of Freshwater West landfall option.	Project Area; Swamp and fen habitats and species.

Name	Location to the Project	Reason for Consideration
Stackpole	Overlapped by Project Area; Broadhaven South landfall option is within the site.	Project Area; Coastal habitats and species; freshwater habitats and species; greater and lesser horseshoe bats; and otter.
Stackpole Quay - Trewent Point	Overlapped by Project Area; Greenala Point landfall option is within the site; Adjacent to Freshwater East landfall site.	Project Area; breeding chough; breeding peregrine falcon; geology.
Stackpole Courtyard Flats and Walled Garden	Overlapped by Project Area; 3.6 km northeast of Bullslaughter Bay landfall option.	Project Area; Greater and lesser horseshoe bats; other bat species.
Park House Outbuildings, Stackpole	Overlapped by Project Area; 4.4 km northeast of Bullslaughter Bay landfall option.	Project Area; Greater and lesser horseshoe bats; and other bat species.
Orielton Stable Block and Cellars	Overlapped by Project Area; 5 km north of Bullslaughter Bay landfall option.	Project Area; Greater and lesser horseshoe bats; and other bat species.
Freshwater East Cliffs to Skrinkle Haven	Overlapped by Project Area; Western boundary is on Freshwater East beach, approximately 380m north-east of the Freshwater East landfall.	Project Area; geology; coastal cliff habitats and species.
Carew Castle	0.9km north of Project Area	Greater horseshoe bats and other bat species.
Dale and South Marloes Coast	Adjacent to northwest boundary of Project Area.	Marine mammals (grey seal).
Skokholm	Adjacent to northwest corner of Project Area; 26 km north-northwest of the offshore PDZ area.	Breeding seabirds (various species); breeding chough; and marine mammals (grey seal).
Skomer Island and Middleholm	4 km northwest of Project Area; 30 km north-northwest of offshore PDZ area.	Breeding seabirds (various species); breeding chough; and marine mammals (grey seal).
Grassholm Island	15 km west of Project Area; 35 km northwest of offshore PDZ area.	Seabirds and marine mammals.
Ramsey / Ynys Dewi	18 km northwest of Project Area; 44 km north-northwest of offshore PDZ area.	Breeding seabirds (gannet); and marine mammals (grey seal).

Name	Location to the Project	Reason for Consideration
St. David's Peninsula Coast	19 km north of Project Area.	Breeding coastal birds (chough, peregrine falcon); and marine mammals (grey seal).
Offshore Islets of Pembrokeshire	20 km northwest of Project Area.	Marine mammals (grey seal).
Burry Inlet and Loughor Estuary	45 km east of Project Area.	Wintering / migratory water birds (various species).
Taf Estuary / Aber Taf	30 km northeast of Project Area.	Migratory fish (shad species).
Penbrey Coast / Arfordir Pen-Bre	31 km northeast of Project Area.	Migratory fish (shad species).
Afon Tywi	37 km northeast of Project Area.	Migratory fish (shad species); otter.
Arfordir Abereiddi	26 km north of Project Area.	Marine mammals (grey seal).
Aberarth – Carreg Wylan	42 km north northeast of Project Area.	Marine mammals (bottlenose dolphin, grey seal); breeding seabirds (various species); and breeding chough.
Afon Teifi	44 km northeast of Project Area.	Marine mammals (bottlenose dolphin); migratory fish (various species); and otter.
Blackpill, Swansea	55 km east of Project Area.	Wintering water birds (sanderling, ringed plover).
National Nature Reserves		
Stackpole	Overlapped by Project Area; as per Stackpole SSSI.	Project Area As per Stackpole SSSI.
Skokholm	As per Skokholm SSSI.	Breeding seabirds (various species); and marine mammals (grey seal).
Skomer Island	As per Skomer Island and Middleholm SSSI.	Breeding seabirds (various species); breeding coastal birds (chough, peregrine falcon); and marine mammals (grey seal).
Ramsey Island	As per Ramsey / Ynys Dewi SSSI.	Breeding seabirds (various species); breeding coastal birds (chough, peregrine falcon); and marine mammals (grey seal).
Grassholm Island	As per Grassholm Island SSSI.	Breeding seabirds (gannet, guillemot, razorbill shag).

Name	Location to the Project	Reason for Consideration
Marine Conservation Zones		
Skomer	4 km northwest of Project Area; 30 km north-northwest of PDZ site.	Marine mammals (grey seal).
North West of Lundy	7.3km southeast of the Project Area.	Subtidal coarse sediment habitat.

6.1.4 Potential Impacts

The potential impacts (changes to the environment) and effects (resultant consequences for an interest feature) of the Project for protected sites are summarised in Table 6.2. For each site, an assessment is then made about whether the potential effects on the interest features have potential to be significant and therefore whether further assessment is needed.

Table 6.2 Summary of Key Sensitivities and Potential Impacts for Designated Sites.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Special Areas of Conservation			
Cleddau Rivers/ Afonydd Cleddau	Noise disturbance. Harm/ injury of fish migrating between sea and rivers. EMF impacts on migratory fish.	Yes (migratory fish)	Precautionary inclusion due to migratory fish features that must pass through the Study Area during migration to and from the river system. Behavioural changes and injury to individuals migrating though the Project Area could affect population conservation status.
Bristol Channel Approaches / Dynesfeydd Môr Hafren	Noise disturbance. Potential harm and disturbance/ displacement to harbour porpoise. Potential to act cumulatively with existing activities (e.g. vessel movements).	Yes (harbour porpoise)	Behavioural changes and injury to individuals using the Project Area could affect population conservation status.
West Wales Marine / Gorllewin Cymru Forol	Noise disturbance. Potential harm and disturbance/ displacement to harbour porpoise. Potential to act cumulatively with existing activities (e.g. vessel movements).	Yes (harbour porpoise)	Behavioural changes and injury to individuals using the Project Area could affect population conservation status.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Pembrokeshire Bat Sites and Bosherton Lakes / Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton	Installation of cable landfall and onshore cabling in bat foraging habitats, including across linear features which could disrupt navigation corridors.	Yes (greater horseshoe bat & lesser horseshoe bat)	Reduced foraging success could lead to harm and reduced breeding success of bats, affecting population conservation status No direct or indirect effects on lake habitats or bat roosting habitats. No effects on otter habitat.
Pembrokeshire Marine / Sir Benfro Forol	Installation of export cable and landfall in marine and coastal habitats; Noise disturbance. Direct damage and loss of habitats and plant species; disturbance and harm to grey seal, otter and of fish migrating between sea and rivers.	Yes (all features)	Damage and loss of intertidal and sea cave habitats and vegetation could affect site integrity. Disturbance and harm to grey seals and otters could affect mammal population conservation status. Disturbance to lamprey and shad fish species could reduce recruitment and spawning success, affecting population conservation status.
Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru	Installation of cable landfall and onshore cabling. Direct damage and loss of cliff habitats and vegetation (Freshwater West, Bullslaughter Bay, New Quay Beach and Broadhaven South landfall options) and sand dune habitats (Freshwater West, Broadhaven South). Damage to bat roost sites in caves and changes to foraging habitat, including to linear features which could disrupt navigation.	Yes (all features)	Damage and loss of sea cliff, dune or grassland habitats could affect site integrity. Damage of roost sites and changes to foraging habitat could affect conservation status of horseshoe bat populations.
Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd	Noise disturbance. Harm/ injury of fish migrating between sea and rivers. EMF Effects.	Yes (lamprey spp &, shad spp)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status. No direct or indirect effects on otter or otter habitat given distance from Project Area.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Lundy	Noise disturbance. Harm/ injury to grey seal.	Yes (grey seal)	Risks due to noise impacts, and work vessel traffic, EMF etc..
Cardigan Bay	Noise disturbance. Harm/ injury to bottlenose dolphin, grey seal and migrating lamprey spp.	Yes (bottlenose dolphin, grey seal, lamprey spp.)	Risks due to noise impacts, and work vessel traffic, EMF etc.; disturbance / harm to migrating fish could reduce recruitment and spawning success, affecting population conservation status.
River Tywi / Afon Tywi	Noise disturbance. Harm/ injury of fish migrating between sea and rivers.	Yes (lamprey spp. &, shad spp.)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status. No direct or indirect effects on otter given distance from Project Area.
River Teifi / Afon Teifi	Noise disturbance. Harm/ injury of fish migrating between sea and rivers.	Yes (lamprey spp. & Atlantic salmon)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status. No effects on otter given distance from Project Area.
Llyn Peninsula and the Sarnau / Pen Llyn a`r Sarnau	Noise disturbance. Harm/ injury to bottlenose dolphin and grey seal.	Yes (bottlenose dolphin & grey seal)	Disturbance of individual dolphins and seals using the Project Area could affect population conservation status. No effects on otter given distance from the Project Area.
Saltee Islands	Noise disturbance. Harm/ injury to grey seal.	Yes (grey seal)	Disturbance of individual seals using Project Area could affect population conservation status. No effects on otter given distance from the Project Area.
Severn Estuary / Môr Hafren	Noise disturbance. Harm and disturbance to fish migrating between sea and rivers.	Yes (lamprey spp. &, shad spp.)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
River Usk / Afon Wysg	Noise disturbance. Harm/ injury of fish migrating between sea and rivers.	Yes (lamprey spp., shad spp. &, Atlantic salmon)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status.
River Wye / Afon Gwy	Noise disturbance. Harm/ injury of fish migrating between sea and rivers.	Yes (lamprey spp., shad spp. &, Atlantic salmon)	Disturbance to fish could reduce recruitment and spawning success, affecting population conservation status. No effects on habitat features.
Special Protection Areas			
Skomer, Skokholm and the Seas off Pembrokeshire	Surface infrastructure provides collision hazards. Potential reduced prey availability from effects on fish species. Harm and injury to foraging seabirds and reduced foraging success and efficiency. Chough that breed at this site could be disturbed by offshore cable laying if Pembroke Dock landfall site is chosen, and could also be connected to Castlemartin Coast SPA, e.g. used during the over wintering period.	Yes (breeding seabirds, chough)	The Project is within foraging ranges of storm petrel (91.7 km), Manx shearwater (330 km), puffin (105.4 km) and lesser black- backed gull (141 km) (Thaxter *et al.*, 2012). Harm/injury to individual birds could affect population breeding success. Chough scoped in due to potential disturbance during construction (marine traffic / cable laying) and connectivity to other SPA populations; chough from Skomer and Skokholm populations may winter in the Castlemartin SPA. No effects predicted for short-eared owl as they forage onshore.
Castlemartin Coast	Installation of cable landfall and onshore cabling for Freshwater West, Bullslaughter Bay, New Quay Beach and Broadhaven South landfall options. Direct harm and disturbance to nesting chough.	Yes (chough)	Injury/disturbance and potential breeding failure could affect conservation status of chough population.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Grassholm	Potential reduced prey availability from effects on fish species. Harm and disturbance to foraging gannets, and reduced foraging success and efficiency.	Yes (breeding gannets)	The Project Area is within foraging ranges of gannets (229.4km). Harm to individual birds could affect population breeding success and conservation status.
Carmarthen Bay / Bae Caerfyrddin/	No predicted direct or indirect impact or effects.	No	The SPA encompasses key areas for wintering common scoter; however, the Project Area does not encroach into the SPA and wintering common scoter would not travel to the Project Area to feed.
Ramsay and St David's Peninsula Coast	No direct impacts, but choughs that breed at this site could be connected to Castlemartin Coast SPA, e.g. used during the over wintering period.	Yes	Chough scoped in due to potential connectivity to other SPA populations (e.g. Skomer, Skokholm, Castlemartin Coast);
Burry Inlet	Surface infrastructure provides collision/barrier risk.	Yes (wintering / migratory water birds)	The only potential impact is a barrier effect caused by the surface structure of the PDZ MOS platform. This impact will likely be low or negligible, but migratory pathways must be reviewed against the final PDZ MOS platform location before this site can be scoped out.
Northern Cardigan Bay / Gogledd Bae Ceredigion	No predicted direct or indirect impact or effects.	No	The SPA encompasses key areas for wintering red-throated diver; however, the Project Area does not encroach into the SPA and red-throated diver are unlikely to travel to the Project Area to feed.
Lady's Island Lake	Surface infrastructure could provide barrier effect to migrating birds. Potential reduced prey availability from effects on fish species. Reduced foraging success.	Yes (wintering / migratory water birds)	Need to consider migratory routes of wintering water birds and whether they may cross the Project Area. Breeding seabirds are scoped out: the maximum foraging range of the qualifying species is 49 km; meaning they are unlikely to interact with the Project Area.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Tacumshin Lake	Surface infrastructure provides collision/barrier effect to migrating birds.	Yes (wintering / migratory water birds)	The only potential impact is a barrier effect caused by the surface structure of the PDZ MOS platform. This impact will likely be low or negligible, but migratory pathways must be reviewed against the final PDZ MOS platform location before this site can be scoped out. Breeding species (reed warbler, gargeney, marsh harrier) are scoped out as are unlikely to interact with the Project Area.
Saltee Islands	Potential reduced prey availability from effects on fish species. Reduced foraging success and efficiency.	Yes (breeding seabirds, except shag)	The PDZ MOS platform will not pose a collision or barrier risk to breeding seabirds. There may however be indirect impacts due to effects on prey fish species.
Aberdaron Coast and Bardsey Island	Potential reduced prey availability from effects on fish species. Harm and disturbance to foraging Manx shearwater, and reduced foraging success and efficiency.	Yes (Manx shearwater)	The PDZ MOS platform will not pose a collision or barrier risk to Manx shearwater. There may however be indirect impacts due to effects on prey fish species. Impacts on individual shearwater could affect population breeding success and conservation status. Chough population will not be affected: breeding chough do not forage further than 1km from nesting site (Thorpe and Young, 2009), and unlikely to travel >100 km to winter in Project Area.
Severn Estuary/ Môr Hafren	Potential barrier effect.	Yes (wintering/ migratory water birds)	The only potential impact is a barrier effect caused by the surface structure of the PDZ platform. This impact will likely be low or negligible, but migratory pathways must be reviewed against the final PDZ MOS platform location before this site can be scoped out.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Ramsar Sites			
Burry Inlet	As per Burry Inlet SPA	Yes	As per Burry Inlet SPA
Cors Caron	No predicted direct or indirect impact or effects.	No	Whooper swan population will not be affected by onshore works.
Severn Estuary	Noise disturbance. Harm and disturbance to fish migrating between sea and rivers. Potential barrier effect to birds.	Yes (migratory fish species; wintering / migratory water birds)	Disturbance to fish could reduce recruitment and spawning success, affecting population conservation status.
Sites of Special Scientific Interest			
Aber Taf / Taf Estuary	Noise disturbance. Harm and mortality of fish migrating between sea and rivers.	Yes (shad spp., lamprey spp.)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status.
Aberarth – Carreg Wylan	Noise disturbance. Harm and mortality to grey seal, bottlenose dolphins and seabirds.	Yes (grey seal, bottlenose dolphins)	Mortality of mammals and birds could affect breeding success and population conservation status. No effects on chough; breeding chough do not forage further than 1km from nesting site (Thorpe and Young, 2009), and unlikely to travel >100 km to winter in Project Area.
Afon Teifi	Noise disturbance. Harm/ injury of fish migrating between sea and rivers, and to dolphin.	Yes (lamprey spp., Atlantic salmon, bottlenose dolphin)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status. Collision with subsurface structures is no longer an anticipated risk however. Disturbance of dolphins using Project Area could affect population conservation status. No effects on otter given distance from Project Area.
Afon Tywi	As per Afon Tywi SAC.	Yes (shad spp., lamprey spp.)	As per Afon Tywi SAC.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Angle Peninsula Coast / Arfordir Penryhn Angle	Laying export cable to Freshwater West landfall option; installing Freshwater West landfall site. Potential to disturb breeding chough and fish spawning and nursery grounds.	Yes (spawning fish, chough, peregrine falcon)	No direct impacts on intertidal habitats are expected, but the proximity of the site to potential cable laying and landfall installation works areas means indirect effects on species are possible.
Arfordir Abereiddi	Noise disturbance. Harm and mortality to grey seal.	Yes (grey seal)	Disturbance / harm to grey seal in the vicinity of the Project Area could affect population conservation status.
Arfordir Pen-Bre / Penbrey Coast	Noise disturbance. Harm and mortality of fish migrating between sea and rivers.	Yes (shad spp., lamprey spp.)	Disturbance / harm to fish migrating through the Project Area could reduce recruitment and spawning success, affecting population conservation status.
Blackpill, Swansea	Potential harm / mortality of birds, and potential barrier effect.	Yes	The only potential impact is a barrier effect caused by the surface structure of the PDZ platform. This impact will likely be low or negligible, but migratory pathways must be reviewed against the final PDZ MOS platform location before this site can be scoped out.
Broomhill Burrows	Excavations and temporary working areas to install cables and transition pit at Freshwater West landfall option. Direct harm to and loss of dune habitats and associated species, affecting conservation status.	Yes (all features)	The physical structures of dune systems are vulnerable to disturbance and dunes typically do not recover quickly.
Burry Inlet and Loughor Estuary	As per Burry Inlet SPA.	Yes	As per Burry Inlet SPA.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Castlemartin Corse	No direct effects on SSSI; onshore cable routes would not need to pass through it. Onshore cable routes from Bullslaughter Bay, and potentially Freshwater West, landfall options will need to cross the upstream catchment; potential changes in hydrology and water quality if cables are not laid within existing roads.	Yes	Changes to hydrology and water quality in the catchment could affect sensitive downstream habitats and species in the SSSI. The risk may be able to be 'designed out' during project development, and by implementing good working practices as part of an Construction Environmental Management Plan, but there is not enough certainty to scope out at this stage.
Castlemartin Range	Installation of cable landfall and onshore cabling at Bullslaughter Bay and New Quay Beach landfall options. Direct damage and loss of cliff habitats and vegetation. Damage to bat roost sites in caves and changes to foraging habitat, including to linear features which could disrupt navigation corridors.	Yes (cliff, grassland and heath habitats; greater and lesser horseshoe bats)	Damage and loss of sea cliff, dune or grassland habitats could affect site integrity. Damage of roost sites and changes to foraging habitat, and related mortality and reduced breeding success, could affect conservation status of horseshoe bat populations. No effects on the dune or wetland habitats within the SSSI (Linney and Brownslade Burrows, Frainslake Vally), or the species they support, are predicted as a cable route from Bullslaughter Bay or New Quay Beach would not go through those habitats.
Dale and South Marloes Coast	Noise disturbance. Harm and mortality to grey seal.	Yes (grey seal)	Mortality of individual seals could affect population conservation status.
Grassholm Island	As per Grassholm SPA.	Yes (gannets)	As per Grassholm SPA.
Gweunydd Somerton Meadows	No effects predicted on the neutral grassland or fungi assemblage.	Yes	This SSSI is conservatively scoped in, pending further certainty around onshore cable routing.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Milford Haven Waterway	Excavations and temporary working areas to install onshore cables from landfall site. Potential for direct damage and loss to wetland habitats, woodland and species they support, and changes to habitats used by horseshoe bats.	Yes (estuarine habitats and species; water birds; reed beds; semi- natural ancient woodland; flowering plant, moss, liverwort and lichen assemblages; horseshoe bats; otter)	There is potential for onshore cable corridors to overlap with this SSSI.
Offshore Islets of Pembrokeshire	Noise disturbance. Harm and mortality to grey seal.	Yes (grey seal)	Disturbance / harm to grey seal in the vicinity of the Project Area could affect population conservation status.
Orielton Stable Block and Cellars	Installation of onshore cables through bat foraging and commuting habitat. Changes to foraging habitat, including to linear features which could disrupt navigation corridors.	Yes (bat species)	Changes to foraging habitat, and related mortality and reduced breeding success, could affect conservation status of bat populations. No direct effects are predicted on the roost sites as no cable route would need to pass through this inland site.
Park House Outbuildings, Stackpole	Installation of onshore cables through bat foraging and commuting habitat. Changes to foraging habitat, including to linear features which could disrupt navigation corridors.	Yes (bat species)	Changes to foraging habitat, and related mortality and reduced breeding success, could affect conservation status of bat populations. No effects on roost sites as no cable route would need to pass through this site.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
Ramsey / Ynys Dewi	Noise disturbance. Harm and mortality to grey seal. No effects predicted on breeding chough.	Yes (grey seal, chough)	Grey seal: Disturbance / harm to grey seal in the vicinity of the Project Area could affect population conservation status. Chough: potential connectivity to Castlemartin Coast SPA population.
Skokholm	As per Skomer, Skokholm and the Seas off Pembrokeshire SPA for seabirds and chough. Noise disturbance. Harm and mortality to grey seal.	Yes (breeding seabirds; chough; grey seals)	Seabirds: Project within foraging ranges of storm petrel (91.7 km), manx shearwater (330 km), puffin (105.4 km), razorbill (95 km), guillemot (135 km), lesser black-backed gull (141 km) and kittiwake (60km) (Thaxter *et al*, 2012). Chough: potential disturbance during construction (marine traffic / cable laying); potential connectivity to Castlemartin Coast SPA population. Mortality of individual birds and seals could affect population conservation status.
Skomer Island and Middleholm	As per Skomer, Skokholm and the Seas off Pembrokeshire for seabirds and chough. Noise disturbance. Harm and mortality to grey seal.	Yes (breeding seabirds; chough; grey seal)	Seabirds: Project is within foraging ranges of storm petrel (91. 7km), manx shearwater (330 km), puffin (105.4 km), razorbill (95 km), guillemot (135 km), lesser black-backed gull (141 km) and kittiwake (60 km) (Thaxter *et al*, 2012). Chough: potential connectivity to Castlemartin Coast SPA population. Injury of individual birds and seals could affect population conservation status. Short-eared owls scoped out as forage onshore. No effects on habitats.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
St. David's Peninsula Coast	Noise disturbance. Harm and mortality to grey seal. No effects predicted on breeding chough.	Yes (grey seal)	Disturbance / harm to grey seal in the vicinity of the Project Area could affect population conservation status.
Stackpole	Installation of onshore cables through bat foraging and commuting habitat. Changes to foraging habitat, including to linear features which could disrupt navigation corridors.	Yes (bat species)	Changes to foraging habitat, and related mortality and reduced breeding success, could affect conservation status of horseshoe bat populations. No effects are predicted on roost sites or the habitats within the Stackpole SSSI itself. No effects on otter habitat.
Stackpole Courtyard Flats and Walled Garden	As per Park House Outbuildings, Stackpole SSSI.	Yes (bat species)	As per Park House Outbuildings, Stackpole SSSI.
National Nature Reserves			
Stackpole	As per Stackpole SSSI.	Yes	As per Stackpole SSSI
Skokholm	As per Skokholm SSSI.	Yes	As per Skokholm SSSI.
Skomer Island	As per Skomer Island and Middleholm SSSI.	Yes	As per Skomer Island and Middleholm SSSI.
Ramsey Island	As per Ramsey SSSI.	Yes	As per Ramsey SSSI.
Grassholm Island	As per Grassholm Island SSSI.	Yes (seabirds)	Project Area is within foraging ranges of gannets (229.4 km), guillemots (135 km) and razorbill (95 km) (Thaxter *et al*, 2012). Injury to individual birds could affect population breeding success and conservation status.
Marine Conservation Zones			
Skomer	Noise disturbance. Harm and mortality to grey seal.	Yes (grey seal)	Disturbance / harm to grey seal in the vicinity of the Project Area could affect population conservation status.

Designated Site	Potential Impact	Scoped in for further assessment?	Rationale for EIA scoping
North West of Lundy	Designated for subtidal coarse sediment habitat.	Yes	Whilst increased suspended sediment as a result of offshore works to install the PDZ MOS platform is unlikely to significantly affect the subtidal coarse sediment of this site, this is better confirmed and assessed in the EIA process, informed by site surveys. The inclusion of this site is due to taking a precautionary approach to 2022 rescoping and not a design change.
Geological Conservation Review Site			
South Pembroke Cliffs	Installation of cable landfall and onshore cabling – Bullslaughter Bay landfall option.	Yes (geology features in limestone cliffs)	Potential for direct damage to geological features of interest. It may be possible to avoid effects by using HDD to install cables and selecting appropriate launch sites, but this cannot be confirmed at this stage.
Regionally Important Geological and Geomorphological Sites			
Bullslaughter Bay	Installation of cable landfall and onshore cabling – Bullslaughter Bay landfall option. Direct damage to geological formation.	Yes (gash breccia rock unit)	Potential for direct damage to gash breccia formed within the limestone. It may be possible to avoid effects by using HDD to install cables and selecting appropriate launch sites, but this cannot be confirmed at this stage.
Longstone Down	As per Bullslaughter Bay.	Yes (karstic landforms)	Potential for direct damage to karstic landforms including surface features such as solution hollows, clints and grykes, depending on final details of landfall.
Caled Quarry	Installation of onshore cabling	Yes	There is potential for onshore cable routes originating from New Quay Beach or Broadhaven South landfall options to pass through this site. This is conservatively scoped in for now – pending finalization of cable routes.

6.1.5 Potential Mitigation

Measures that could be taken to avoid or mitigate potential adverse effects on individual interest features of designated sites are set out in the applicable topic sections (Sections 6.2; 6.3; 6.4; 6.5; and 6.6). General mitigation measures proposed, in the following order of priority, are as follows:

- Design the Project to avoid placing permanent infrastructure or having temporary working areas within protected sites where possible;
- Where complete avoidance of protected sites is not possible, design the Project, including construction and decommissioning methods, to avoid directly affecting interest features within protected sites where possible;
- For mobile species, consider ways of designing permanent infrastructure to minimise the risk of interaction and harm;
- If it is not possible to avoid affecting interest features, develop construction and operation mitigation measures, e.g. timing of works, techniques and working areas to minimise effects, agree reinstatement of temporary works with regulatory authorities, offsetting or enhancement measures; and
- Develop monitoring programmes, where necessary, to assess the effectiveness of mitigation measures and to refine them where necessary.

6.1.6 Environmental Assessment Approach

Baseline data gathering requirements to inform impact assessment on individual features of designated sites is detailed in the topic chapter relevant to the feature in question. Impacts will be assessed as part of the EIA and used in specific assessments related to sites such as Habitats Regulations Assessment (for SAC and SPA) and MCZ Assessment (MCZA) for MCZs. The approach to environmental data collection by CSP will be further informed and refined through this scoping exercisevia consultation with key stakeholders (e.g. NRW).

6.2 Benthic Subtidal and Intertidal Ecology

6.2.1 Data and Information Sources

Benthic ecology data has been obtained from the following sources:

- EUSeaMap 2021
- UKSeamap 2018
- Countryside Council for Wales 1996-2003 Phase I intertidal habitat survey information (NRW, 2022)
- Marine Article 17 Habitats Features Spatial Layer (NRW, 2018)
- Marine Life Information Network (MarLIN, 2022)

6.2.2 Study Area

The study area for benthic subtidal and intertidal ecology includes the Project Area, and extends 5km beyond the boundary of said area (see Appendix A, Figure A6.2.1).

6.2.3 Existing Environment

The Bristol Channel is a dynamic and high energy marine environment, supporting intertidal and subtidal habitat types listed on Annex I of the EC Habitats Directive (Annex I habitats), as well as habitats included on the OSPAR List of Threatened and/or Declining Species and Habitats, and Habitats of Principal Importance (Wales). The Bristol Channel also includes 'Potential Annex I Habitats (PAIH)'; these are areas where the Joint Nature Conservation Committee (JNCC) believe that offshore Annex I habitats might be present, but further survey is needed to confirm their extent. Annex I habitats and PAIH in the Bristol Channel include:

- Reefs (e.g. Ross worm and Honeycomb worm (*Sabellaria spinulosa* and *S. alveolata*, respectively) reefs and edible mussel and horse mussel (*Mytilus edulis* or *Musculus discors* beds, respectively);
- Sandbanks which are slightly covered by seawater all the time;
- Saltmarsh (e.g. Atlantic salt meadows, Spartina swards, inland salt meadows);
- Mudflats and sandflats not covered by seawater at low tides; and
- Submerged or partially submerged sea caves.

Annex I habitats; habitats included on the OSPAR List of Threatened and/or Declining Species and Habitats; Habitats of Principal Importance under Section 7 of the Environment (Wales) Act; and, any other dominant habitats present within the Study Area are listed in Table 6.3 and illustrated in Appendix A, Figures A6.2.1 to A6.2.2.

Close to the landfall site options, benthic habitats mainly consist of littoral and infralittoral rock and biogenic reef. Nearer to the offshore PDZ area, circalittoral coarse and fine sediments are dominant north of the PDZ, and offshore circalittoral sand with small pockets of circalittoral mud within the PDZ area. Apart from the biogenic reef closer to shore, these habitats have no international, national or regional protection; however, they may have sensitive benthic faunal communities which are associated with these habitat types.

Table 6.3 Annex I Habitats and Dominant Habitats in the Study Area

Habitat Name / Biotope code	Protection Status	Distribution/ Density within Study Area	Importance
Annex I Habitats			
Sandbanks which are slightly covered by seawater all the time	- Annex I habitat; - OSPAR List of threatened and declining habitat; - Section 7 Habitat	This Annex I habitat has four main sub-types: 1. Gravelly and clean sands; 2. Muddy sands; 3. Eelgrass (*Zostera marina*) beds; and 4. Maerl beds (composed of free-living Corallinaceae). Isolated pockets of potential and high confidence sandbank areas, namely Turbot Bank and St Gowan Shoals, are found within the Project Area, specifically within the proposed cable route area, closer to shore. There is also seagrass habitat (e.g. *Zostera marina*) present within the Study Area, specifically along the coastline by Pembroke River just south of the power station and by Pembroke Dock (covering an area of approximately 0.9 km^2). There is also a small area of seagrass present in the eastern part of Angle Bay in Milford Haven (approx. 0.0 4km^2). **Qualifying feature of:** **- Pembrokeshire Marine SAC** **- Milford Haven Waterway SSSI (seagrass beds only)**	International
Reefs	- Annex I habitat; - OSPAR List of threatened and declining habitat; - Section 7 Habitat	This Annex I habitat includes: 1. *Sabellaria* spp. reefs 2. *Mytilus edulis* and/or *Musculus discors* mussel beds There are areas of bedrock with potential and high confidence biogenic/bedrock reef habitat found along the Pembrokeshire coastline (see Figure A6.2.2). With regards to *Sabellaria* spp. reefs, there are small isolated pockets on the western side of the Study Area. There are also areas of mussel beds to the west of the Study Area. There is also a very small pocket of specifically blue mussel (*M. edulis*) beds within the Milford Haven Waterway SSSI. **Primary qualifying feature of:** - **Pembrokeshire Marine SAC** - **Milford Haven Waterway SSSI (mussel beds only)**	International

Habitat Name / Biotope code	Protection Status	Distribution/ Density within Study Area	Importance
Saltmarsh (Atlantic salt meadows, *Spartina* swards)	- Annex I habitat; - OSPAR List of threatened and declining habitat; -Section 7 Habitat	Saltmarsh habitat present within the Study Area, specifically along the coastline by Pembroke River just south of the power station and by Pembroke Dock (covering an area of approximately 0.2 km^2). There is also a small area of saltmarsh (approx. 0.012 km^2) present in the western part of Angle Bay in Milford Haven. **Qualifying feature for:** **- Pembrokeshire Marine SAC** **- Milford Haven waterway SSSI**	International
Mudflats and sandflats not covered by seawater at low tide	- Annex I habitat; - OSPAR List of threatened and declining habitat; - Section 7 Habitat	Intertidal mudflats present along the north coast of the peninsula within Milford Haven and Pembroke River, including a large area in Angle Bay. **Qualifying feature for:** **- Pembrokeshire Marine SAC** **- Milford Haven waterway SSSI**	International
Submerged or partially submerged sea caves	- Annex I Habitat	There is a high density of submerged or partially submerged sea caves along the Pembrokeshire coastline within the Study Area (see Figure A6.2.2). **Qualifying feature of:** - **Pembrokeshire Marine SAC**	International
Dominant Habitats			
Circalittoral Mixed Sediment (SS.SMx.CMx)	Not protected.	Large area covering the majority of the offshore PDZ area, and the potential cable route area (see Figure A6.2.1).	Local
Circalittoral Fine Sand (SS.SSa.CFiSa)	Not protected.	Large area located within the Study Area (see Figure A6.2.1), specifically within the offshore PDZ area.	Local
Circalittoral Coarse Sediment (SS.SCS.CS)	Not protected.	This habitat makes up a large proportion of the proposed cable route area (see Figure 6.2.1).	Local
Offshore Circalittoral Mixed Sediment (SS.SMx.Omx)	Not protected.	Located throughout the Study Area (see Figure A6.2.1).	Local
Offshore Circalittoral Sand (SS.SSa.OSa)	Not protected.	Large area of this habitat located within the Study Area, covering the majority of the PDZ, and sparse areas in the wider Study Area (see Figure A6.2.1).	Local

6.2.4 Potential Impacts

The potential impacts of the proposed Project on benthic subtidal and intertidal ecology are set out in Table 6.4.

Table 6.4 Summary of Key Sensitivities and Potential Impacts for Benthic Subtidal and Intertidal Ecology

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
All subtidal and intertidal habitats and species	Physical disturbance and habitat loss due to excavation/open cut trenching for cable laying activities	Yes	There is a significant amount of Annex I habitat, both biogenic reef and sandbank, in the vicinity of potential export cable routes. Potential impacts from seabed preparation, cable laying, anchoring and jacking-up activities are anticipated to result in short-term, temporary impacts from which habitats and species will be able to recover once construction is complete. Physical disturbance due to foundation installation (and cable protection installation if required) will result in long-term or permanent habitat loss, albeit within a relatively small footprint in the context of habitat from the surrounding region. Given the longevity of the Project, the assessment assumes that habitat loss would effectively be permanent. For this reason, impacts due to foundation installation will be assessed as part of the construction phase impacts.
All subtidal and intertidal habitats and species	Increased suspended sediment concentrations and subsequent deposition	Yes	Potential effects during construction include temporary disturbance of the seabed due to the installation activities for inter-array cables and foundations which release sediment into the water column, resulting in increased suspended sediments and subsequent deposition (and potential for smothering of benthos). Installation activities that could involve such seabed disturbance include seabed preparation and installation methods such as ploughing/trenching and burial, piling and hammering. These effects will be assessed as part of the EIA.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
All subtidal and intertidal habitats and species	Remobilisation of contaminated sediments	Yes	Existing contaminants that may be contained within the surface sediments may be re-mobilised by construction activity. This has the potential to impact on benthic communities should benthic sediment feeders and filter feeders ingest and uptake released contaminants, which could subsequently enter the food chain, potentially accumulating in predatory species. Whilst this impact is currently scoped in, it is recommended the Applicant seeks to scope this out of further assessment during the EIA, if site-specific benthic sampling demonstrates low levels of sediment contamination.
All subtidal and intertidal habitats and species	Introduction of hard substrate	Yes	Cable protection (if necessary) would be used in areas of hard substrate, stony reef or bedrock which are areas of potential Annex I habitats and therefore could cause a significant change to the existing baseline. The introduced substrate may also create new habitat, with associated benefits and costs to different species.
All subtidal and intertidal habitats and species	Unplanned/accidental release of pollutants or chemicals into the water column from work vessels	No (pending further consultation with NRW)	All vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environment Management Plan (PEMP) will also be produced post-consent and implemented to cover the construction, operation and maintenance phases of the Project. This will set out all procedures and measures (in the form of a Marine Pollution Contingency Plan (MPCP)) to be taken during construction and operation to minimise the risk of, and subsequently manage in the event of an accidental spill. The PEMP will be developed in consultation with key stakeholders for approval by NRW. This embedded mitigation is often viewed as sufficient and the impact is often not assessed further in the EIA process.
All subtidal and intertidal habitats and species	Accidental introduction of Invasive Non-native Species (INNS)	Yes	Invasive species, if present, have the potential to alter benthic communities and reduce biodiversity. Potential impacts from invasive species will be considered further in the assessment, alongside INNS prevention methods that will be adhered to.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Operational Phase			
All impacts scoped into, and out of, the construction phase will be similarly scoped in the operational phase. In addition, the below impact has been considered in this report.			
All subtidal and intertidal habitats and species	Interactions with EMF	No	EMFs as a result of the presence of offshore cables may be detected by some benthic species. Effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2005). Several studies have shown that various benthic species do not react to EMF such as brown shrimp *Crangon crangon*, common starfish *Asterias rubens* and polychaete worm *Nereis diversicolor* (Bochert & Zettler, 2006). Gibb et al. (2014) state there is no evidence of EMF impacting *Sabellaria spinulosa*. It is therefore proposed that interactions with EMFs is scoped out of the assessment. There is now evidence of EMF effects on larger crustaceans such as edible crab *Cancer pagurus* and European lobster *Homarus Gammarus* (Scott et al., 2021; Harsanyi et al., 2022). However, we suggest that this impact is better assessed in the Fish and Shellfish Ecology chapter.
Decommissioning Phase			
All impacts scoped into, and out of, the construction phase will be similarly scoped in the decommissioning phase. However, baseline conditions may have changed, especially around the platform as different ecological communities may have developed around the sub-surface structures. This will need to be understood to inform the final decommissioning approach.			
Cumulative Impacts are scoped in for this receptor group			

6.2.5 Potential Mitigation

Mitigation measures will be developed as part of the design development and EIA as an iterative design and appraisal process, focussed on the following key tasks:

- Liaise with regulatory authorities; and design the offshore works to avoid sensitive features (e.g. reef) wherever possible;
- Minimise the footprint of working area, where possible;
- Production of an Environmental Management Plan (EMP) to ensure control measures are put in place to minimise the risk of accidental spills and leaks during construction; and
- Consider construction techniques to avoid directly affecting important features, e.g. using Horizontal Directional Drilling (HDD) to install cables at the landfall.

6.2.6 Environmental Assessment Approach

Both a desktop review and site surveys (using grab samples and drop-down cameras) are proposed to be used to inform the benthic ecology baseline.

The desktop review will provide broadscale information regarding the seabed habitat types (using datasets such as EUSeaMap 2021; UKSeamap 2018) found in the study area. This broadscale characterisation will be supplemented by fine-scale site-specific surveys, both geophysical and sediment grab/drop down video. Grab samples will be used to characterise infaunal communities. Drop down video transects, which will target areas of interest identified from the geophysical survey, will be used to identify localised epibenthic sensitivities (e.g. biogenic reef).

Data analysis will be corroborated and expanded upon by consultation with relevant stakeholders. Consultation will not only seek to validate the baseline, but also to identify any other additional data sources and understand stakeholder concerns to inform the impact assessment.

6.3 Fish and Shellfish Ecology

6.3.1 Data and Information Sources

The fish and shellfish data and information in the Study Area has been obtained from the following sources:

- Fisheries Sensitivity Maps in British Waters (Coull et al., 1998);
- Mapping spawning and nursery areas of species to be considered in Marine Protected Areas (Marine Conservation Zones) (Ellis et al., 2010); and
- Spawning and nursery grounds of selected fish species in UK waters (Ellis et al., 2012).
- Marine Life Information Network (MarLIN, 2022);

6.3.2 Study Area

The study area for fish and shellfish ecology includes the Project Area (Figure 2.1), and extends 5km beyond the boundary of said area. A larger Study Area encompassing 100 km around the Project Area was used to identify populations of migratory fish that have potential to travel through the Project Area as part of their lifecycle (e.g. Allis shad, sea lamprey, Atlantic salmon and European eel that form part of protected site designations within 100 km of the Project Area). Protected sites further than 100 km have not been considered as species from protected sites further away are unlikely to travel into the Project Area in high enough numbers for the population of qualifying species to be significantly impacted.

6.3.3 Existing Environment

The variable seabed conditions across the southwestern coasts of England and Wales support a wide variety of fish species, and the fish communities present can be broadly categorised as migratory (which encompasses diadromous species), demersal, pelagic, and elasmobranchs (sharks and rays).

Migratory (diadromous) species present within the Study Area include sea lamprey *Petromyzon marinus*, twaite shad *Alosa fallax*, and allis shad *Alosa alosa*, which are listed on Annex II on the EC Habitats Directive and are a qualifying feature for the Pembrokeshire Marine SAC. In addition, the two-latter species are also listed as Section 7[4] fish species. Salmon *Salmo salmo* is another species which migrates through the Severn Estuary to spawn in its associated rivers; the Severn, Wye, and Usk. Spawning is likely to take place in a number of other rivers, those considered to be of relevance in the region include the Rivers Tywi, Taf, and Cleddau. Additionally, the European eel *Anguilla anguilla* is also known to migrate from freshwater rivers and migrate seawards to spawn in the Sargasso Sea (Sinha & Jones, 1975; Ellis et al., 2010).

Commonly occurring and notable demersal species include cod *Gadus morhua*, plaice *Pleuronectes platessa*, sole *Solea solea*, lemon sole *Microstomus kitt*, and several species of ray (*Raja* spp.), which all have spawning and/or nursery grounds within the Study Area.

There is also an abundant pelagic fish community within the Bristol Channel, with many species present including Atlantic mackerel *Scomber scombrus* and herring *Clupea harengus*, which are important to the commercial fishing activity in the region (see Section 7.1, Commercial Fisheries).

[4] *Species of Principal Importance under Section 7 of the Environment (Wales) Act.*

Demersal species in the Fish and Shellfish Study Area include spurdog *Squalus acanthias* and sandeels *Ammodytes* spp., the latter being an important food source for many higher-trophic level fish, sea birds and marine mammals (Greenstreet et al., 2010).

Details of protected and notable fish species present in the Study Area are listed in Table 6.5. This table also highlights their protection status and if they are a qualifying feature for any nearby designated sites. These species will be taken forward for assessment. Further species may be included in the assessment following review of the latest landings data for the Study Area during the EIA process.

Table 6.5 Fish and Shellfish of International/National Importance in PDZ Study Area and Surroundings

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
Migratory Fish Species			
Allis shad ***Alosa alosa***	HD; WCA; OSPAR; Section 7 species	**Adults:** A coastal species which migrate through the Bristol Channel and Severn Estuary up into rivers to spawn in early spring and move up into the rivers (such as the Usk, Wye, Severn and Tywi) with nocturnal spawning over gravel and stony beds occurring in April to June, before the fish return to the sea by the end of summer. **Spawning/Juveniles:** This species returns from the sea to spawn in spring, usually between April and June, hence the alternative name for Shad is 'May fish' (Maitland & Hatton-Ellis, 2003). There are three river systems which run into the Bristol channel, Severn Estuary, and Carmarthen Bay areas, namely the River Wye, River Usk and River Tywi (JNCC, 2022a). Allis shad are known to migrate through the waters of Carmarthen Bay and Estuaries to reach spawning sites in the River Twyi. **Qualifying feature of: Pembrokeshire Marine SAC; Carmarthen Bay and Estuaries SAC; River Wye SAC; River Usk SAC; and River Tywi SAC.**	International
Twaite shad ***Alosa fallax***	HD; WCA; OSPAR; Section 7 species	**Adults:** Migratory patterns are the same as for Allis shad. **Spawning/Juveniles:** Similar to Allis Shad, this species returns from the sea to spawn in spring, usually between April and June, hence the alternative name of 'May fish' (Maitland & Hatton-Ellis, 2003). There are three river systems which run into the Bristol channel, Severn Estuary, and Carmarthen Bay areas, namely the River Wye, River Usk and River Twyi. While these rivers are not within the Study Area, they include this sensitive species which may migrate though the Study Area into the Severn Estuary and Bristol Channel area. **Primary qualifying feature of: Severn Estuary SAC; River Wye SAC; River Usk SAC; and River Tywi SAC. Qualifying feature of: Carmarthen Bay and Estuaries SAC; Pembrokeshire Marine SAC.**	International
Sea lamprey ***Petromyzon marinus***	HD; OSPAR; Section 7 species	**Adults:** Migratory species, which occurs offshore throughout the UK, migrating upstream into British rivers in August to spawn. Sea lamprey is a demersal and anadromous species found in a wide range of riverine and offshore habitats. **Spawning/Juveniles:** Spawning in British rivers starts when the water temperature reaches 10–11ºC, usually in March and April (Morris & Maitland 1987; Maitland, 2003). Like the other species of lamprey, sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes, therefore polluted sections of river, may impede migration to spawning grounds. **Primary qualifying feature of: Severn Estuary SAC; River Wye SAC; River Usk SAC. Qualifying feature of: Carmarthen Bay and Estuaries SAC; Cardigan Bay SAC; Pembrokeshire Marine SAC; River Tywi SAC.**	International

[5]*Berne Convention: Berne Convention on the Conservation of European Wildlife and Natural Habitats 1979; HD: EC Habitats Directive; WCA: UK & NI Wildlife & Countryside Act 1981; OSPAR: Oslo & Paris Convention List of Threatened and/or Declining Habitats and Species 1998; IUCN: International Union of Conservation of Nature Red List of Threatened Species;; CMS: Convention of Migratory Species; Eels Regs: The Eels (England & Wales) Regulations 2009; SPI: Species of Principal Importance (Wales) under Section 7 of the Environment (Wales) Act 2016 .*

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
River lamprey *Lamptera fluviatilis*	HD; Section 7 species	**Adults:** Occurs close to the coast throughout the UK, migrating upstream many British rivers, including the River Usk, River Wye, and Severn Estuary in August to spawn. River lamprey is a demersal and anadromous species found in a wide range of riverine and coastal habitats. **Spawning/Juveniles:** Similar to Sea Lamprey, spawning in British rivers starts when the water temperature reaches 10–11ºC, usually in March and April (Morris & Maitland 1987; Maitland, 2003). Clear water and suitable areas of gravels, silt or sand are required for spawning and to hold healthy populations of this species. The River Usk, River Wye, River Tywi, and Severn Estuary are all areas in which river lamprey spawn. The River Wye especially has exceptionally good quality habitat for river lamprey and supports a healthy population. **Primary qualifying feature of: Severn Estuary SAC; River Wye SAC; River Usk SAC. Qualifying feature of: Cardigan Bay SAC; Carmarthen Bay and Estuaries SAC; Pembrokeshire Marine SAC; and River Tywi SAC.**	International
Atlantic salmon *Salmo salar*	HD; OSPAR;	**Adults:** Found along the coast of Wales, in the outer Bristol Channel and in the Irish Sea. Adult Atlantic salmon spend their life at sea, returning to freshwater to spawn. The juveniles inhabit freshwater areas, before migrating to the sea. **Spawning/Juveniles:** They spend most of their lives out at sea, returning to spawn in the same stretch of river or stream in which they hatched. They travel upstream in early summer to the gravelly-bottomed headwaters and spawn in late Autumn (NWWT, 2018). High quality spawning grounds and nursery habitats are present in the River Wye and River Usk. The Wye population is of considerable importance in the UK (JNCC, 2022a). **Primary qualifying feature of: River Wye SAC; River Usk SAC.**	International
European common eel *Anguilla anguilla*	OSPAR; IUCN (critically endangered); Eels Regs; Section 7 species	**Adults:** The adult eel is a nocturnal species, most abundant in estuaries and low salinity pools but is also found around the coast in permanent tide pools, on the lower shore and shallow sublittoral. Widely distributed around the British coast (MarLIN, 2022). **Spawning/Juvenile:** European adult populations spawn in the Sargasso Sea off the coast of North America (Sinha & Jones, 1975; Ellis *et al*., 2010). Juvenile eels migrate to freshwater where they spend most of their adult lives. Juveniles arrive in the UK in springtime (JNCC, 2022a) and it is anticipated that they will travel through the Study Area in order to get to rivers within the Bristol Channel and Severn Estuary (MCSUK, 2022).	International
Fish – Demersal			
Atlantic cod *Gadus morhua*	OSPAR; IUCN (Vulnerable) Section 7 species	**Adults:** Atlantic cod are found all around the British and Irish coast. Demersal species, commonly found throughout the Study Area. **Spawning/Juveniles:** High intensity spawning grounds are present within the Study Area, particularly within the PDZ, as well as low intensity spawning grounds to the east of the PDZ. Spawning season occurs between January and May with peak spawning in February and March when buoyant eggs are released and transported for miles by ocean currents (Dipper, 2001; Ellis *et al.*, 2012). This means there are no nursery grounds in the Study Area for this species, because they are pelagic at planktonic stage until two months old, and will then become demersal (Ellis *et al.*, 2012).	International

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
Common skate ***Dipturus batis***	OSPAR; IUCN (critically endangered); Section 7 species	**Adults:** Populations of common skate are found off the coast of the Bristol Channel. The skate lives on sandy and muddy bottoms. The adults live in depths of 10 to 600 m while younger specimens prefer shallower waters (MarLIN, 2022). This is a demersal and mobile species which are found in and around the Study Area. **Spawning/Juvenile:** Insufficient data on spawning grounds, but juvenile skate were captured in the Celtic Sea. There is no evidence to suggest high or low intensity spawning or nursery grounds in or near the Study Area (Ellis *et al*., 2010).	International
Spotted ray ***Raja montagui***	OSPAR; Section 7 species	**Adults:** Found within the Bristol Channel and within the Study Area. They are also found within the wider area, around the British Isles (NBN Atlas, 2022). **Spawning/Juveniles**: Low intensity nursery grounds found within the Study Area, extending up to the West Welsh coast, down towards England, and up to the mid-section of the Bristol Channel. There is insufficient data on the occurrence of egg cases or egg-bearing females in the spawning season, although these should broadly overlap with nursery grounds. Demersal spawners - peak spawning is likely to occur from May to July (Coull *et al*., 1998, Ellis *et al.,* 2012).	International
Thornback ray ***Raja clavata***	OSPAR; IUCN (near threatened); Section 7 species	**Adults:** Common all-around coasts of Britain, the most abundant ray in inshore waters. Distribution includes Carmarthen Bay. This is a mobile species which is present in the Study Area (MarLIN, 2022). **Spawning/Juveniles:** Nursery ground area similar to that of the spotted ray. Spawning season is expected to occur from February to September, with peak spawning between April and August (Ellis *et al.,* 2010).	International
Angler fish ***Lophius piscatorius***	Section 7 species	**Adults:** Angler fish are present in water depths of 18 m – 550 m; however, they are known to spawn at depths of 2000 m (Thangstad *et al.*, 2006). It is found mostly on sandy or muddy bottoms but is also present on shell, gravel and occasionally rocky areas. **Spawning/Juveniles:** Angler fish are presumed to spawn in deep water on the edge of the continental shelf; however, juvenile anglerfish have been recorded along the western seaboard of the British Isles. There are low intensity nursery grounds within the Study Area and immediate Project Area (Coull *et al*., 1998; Ellis *et al.,* 2012).	National
Plaice ***Pleuronectes platessa***	Section 7 species	**Adults:** Plaice are common all around the waters of Britain and Ireland. Plaice live mostly on sandy bottoms, although they also live on gravel and mud. Often seen on sandy patches in rocky areas. They are most common between 10-50 m but can occur between 0-200 m (MarLIN, 2022). This species is mobile and very common in the Study Area. **Spawning/Juveniles:** Areas of high and low intensity spawning grounds are present within the Study Area and immediate Project Area, as well as in the surrounding outer and mid-Bristol Channel. The spawning period occurs from December to March, with peak spawning occurring in January and February. Low intensity nursery grounds are also present in the eastern section of the Study Area (Coull *et al*., 1998; Ellis *et al.,* 2010; Ellis *et al.,* 2012).	National

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
Sole ***Solea solea***	Section 7 species	**Adults:** Sole are found off the coast around Britain and Ireland. Sole is usually found on sandy and muddy seabeds and also in estuarine habitats. Sole is present from depths of 1- 70 m, except in winter when it moves offshore and can be found down to depths of around 120 m. This species is mobile and found throughout the Study Area. **Spawning/Juveniles:** High and low intensity spawning grounds found within the entire Study Area and the English Channel. High and low intensity nursery grounds in the eastern section of the Study Area and the mid-section of the Bristol Channel. The spawning period is from March to May with the peak spawning month taking place in April (Coull *et al*., 1998; Ellis *et al.,* 2012).	National
Bass ***Dicentrarchus labrax***	Not protected	**Adults:** Bass is a demersal fish present in the littoral zone over most substrata usually depths of 10 m, but have been caught at depths of 70 m. The bass is predominantly a marine fish but are found in brackish water and in summer months enter estuaries and can penetrate some way up rivers. Bass is likely to be present around all coasts of Britain and Ireland, and recorded from the Welsh coast. Highly mobile species and found in the Study Area, therefore at low risk during construction and operation. Bass is a widespread and abundant fish species, present in the Study Area (Coull *et al*., 1998; Ellis *et al.,* 2012). **Spawning/Juveniles:** No spawning areas present in the Study Area as bass are pelagic spawners in open sea (January to June). It is possible that there are nursery grounds in the proposed cable route area, as juveniles move inshore as they grow, aggregating in brackish estuarine nursery areas where they usually remain until their second summer. Large juveniles and adults show a complicated migration pattern at sea, coming close to shore and entering freshwaters of estuaries during summer to forage. Study Area	Local
European hake ***Merluccius merluccius***	Not protected	**Adults:** Highly mobile species found in the western English Channel, in the Irish Sea, and off southern Ireland, including in the Study Area. Found usually between 70 m and 370 m depth. Adults live close to the bottom during day-time, but move off-bottom at night (MarLIN, 2022). **Spawning/Juveniles:** Low intensity spawning and nursery grounds present within the Study Area and extend throughout the outer Bristol Channel and into the Celtic Sea; however, hake are more abundant in deeper waters of the continental shelf, where there is likely to be more high intensity spawning and nursery grounds. Spawning season occurs between January to June with peak spawning time in February and March (Coull *et al*., 1998; Ellis *et al.,* 2012).	Local
Lemon sole ***Microstomus kitt***	Not protected	**Adults:** Mobile species widely distributed through the British Isles and Ireland but most commonly found in the English Channel and Irish Sea including in the Study Area. The lemon sole is a demersal species usually found on stony bottoms from depths of 20 m to 200 m (MarLIN, 2022). **Spawning/Juveniles:** Spawning and nursery grounds present within the eastern section of the Study Area extending out beyond the Project Area to the outer Bristol Channel; however, spawning and nursery grounds are not present in the Project Area (Coull *et al*., 1998; Ellis *et al.,* 2012).	Local

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
Fish – Benthopelagic			
Tope *Galeorhinus galeus*	IUCN (Vulnerable); Section 7 species	**Adults:** A benthopelagic and demersal species inhabiting the upper continental shelf down to a depth of 550 m. Widely distributed off the coasts of Britain (MarLIN, 2022). Mobile species found within the Study Area. **Spawning/Juveniles:** Tope sharks are viviparous and gravid females can be found all year, which produce live young, therefore do not have spawning areas. Low intensity nursery grounds found throughout the Study Area and beyond, covering a large area of the Bristol Channel. Juvenile tope has been caught sporadically in the Irish Sea and Bristol Channel, suggesting they occur in inshore areas with slightly reduced salinity (Coull *et al*., 1998; Ellis *et al.,* 2012).	International
Ling *Molva molva*	Section 7 species	**Adults:** Ling is a member of the Cod family and is a deep-water species found at depths up to 600 m, but juveniles and occasionally adults are found in shallow water depths of 10 m (Seafish, 2012). This species is primarily solitary and benthic, lurking amongst rocks, crevices and wrecks in deep water (MarLIN, 2022). **Spawning/Juveniles:** Low intensity spawning activity in the southern section of the Study Area, encompassing the PDZ area and extends to the outer Bristol Channel and Celtic Sea. Spawning season takes place from February to May. There are no nursery grounds present, as juveniles typically move further offshore. (Coull *et al*., 1998; Ellis *et al.,* 2012).	National
Whiting *Merlangius merlangus*	As per Ling (*Molva molva)*	**Adults:** Whiting is found in the Irish Sea off the coast of Wales. It is a benthopelagic species, usually found at depths of 30-100 m. It can be found near mud and gravel bottoms, but also above sand and rock. They are widespread in the Bristol Channel and within the Study Area (MarLIN, 2022). **Spawning/Juveniles:** Whiting is a species which utilises estuarine habitats and other coastal waters as spawning and nursery grounds. The spawning season for this species occurs from February to June. Low intensity spawning grounds are present within the Study Area, including the PDZ. There are also low intensity nursery grounds here, found throughout the whole Study Area (Coull *et al*., 1998; Ellis *et al.,* 2010; Ellis *et al.,* 2012).	National
Sandeel *Ammodytes* spp.	Section 7 species	**Adults:** The lesser sandeel (*A. tobianus*) is found from mid-tide level over sandy shores to the shallow sublittoral to depths of 30 m, while the Raitt's sand eel (*A. marinus*) is a schooling benthopelagic species, which may congregate in large schools near the surface. Both species bury themselves in sand. It may be found both inshore and offshore and are widely distributed throughout the UK and Ireland, including within the Study Area (MarLIN, 2022). **Spawning/Juveniles:** High intensity spawning grounds and low intensity nursery grounds found throughout the Study Area and beyond. The Irish Sea and Bristol Channel are important spawning grounds for sand eels, with a low intensity nursery ground in the Bristol Channel. Spawning occurs in the winter months (November to February) (Coull *et al*., 1998; Ellis *et al.,* 2012).	National

Receptor	Protection Status[5]	Distribution/density within the Study Area	Importance
Fish – Pelagic			
Horse mackerel *Trachurus trachurus*	Section 7 species	**Adults:** The horse mackerel is a pelagic coastal species that may be found on continental shelves down to over 200 m in depth (MarLIN, 2022). This species is mobile and very common in the Study Area. **Spawning/Juveniles:** Eggs, larvae and juvenile horse mackerel have been recorded in the Bristol channel, specifically in the southern part of the Study Area, which includes the PDZ, suggesting there are low intensity spawning and nursery grounds here. Spawning period of this species takes place between March and August, with the peak time in May and June. The presence of juveniles were widespread throughout UK waters, therefore the nursery grounds cannot be spatially defined (Coull *et al*., 1998; Ellis *et al.,* 2012).	National
Atlantic mackerel *Scomber scombrus*	Section 7 species	**Adults:** Widely distributed in the continental shelf seas around the British Isles and Ireland, usually at depths of less than 200 m. This species is extremely common and found in huge shoals feeding on small fish and prawns (MarLIN, 2022). Mackerel is a widespread and abundant pelagic fish species, present in the Study Area (Coull *et al*., 1998; Ellis *et al.,* 2012). **Spawning/Juveniles:** Low intensity spawning and nursery grounds present within the Study Area, extending west into the Celtic Sea, and north and south of the Study Area. Spawning times in Western UK is between March to July, with peak spawning in May and June. Study Area	National
Atlantic herring *Clupea harengus*	Section 7 species	**Adults:** The Atlantic herring is widespread in UK and Irish waters, occurring in the North Sea, the English Channel, the Irish Sea as well as the Northern Atlantic. It is pelagic in its distribution and occurs in the surface waters down to a depth of around 200 m (MarLIN, 2022). Highly mobile species and found within the Study Area. **Spawning/Juveniles:** Spawning grounds are located close to the coast within the Study Area and immediate Project Area, with low intensity nursery grounds present within the Project Area, specifically along the coast in the proposed cable route areas. Spawning of herring takes place at depths of 15-40 m, with herring depositing their sticky eggs on coarse sand and gravel (Coull *et al*., 1998; Ellis *et al.,* 2010; Ellis *et al.,* 2012).	National
Mollusca			
Icelandic cyprine *Arctica islandica*	OSPAR; Section 7 species	Predominately found on sublittoral firm sediments including level offshore areas, buried in sand and muddy sand that ranges from fine to coarse grains. This species is found within the Study Area (MarLIN, 2022).	International
Crustacea			
European spiny lobster *Palinurus elephas*	IUCN (Vulnerable); Section 7 species	Lives on sub-tidal exposed rocky coasts in the circalittoral zone in a depth range of 5-70 m. One of the main UK populations is found on the South West Coast of Wales. Internationally and nationally protected, and is the qualifying feature for Lundy MCZ. They are a mobile species which also have populations in the Study Area (MarLIN, 2022; JNCC, 2022a).	International

6.3.4 Potential Impacts

The potential impacts of the proposed Project on fish and shellfish ecology are set out in Table 6.6.

Table 6.6 Summary of Key Sensitivities and Potential Impacts for Fish and Shellfish Ecology

Receptor / Receptor Group	Potential Impact	Scoped into EIA	Rationale for EIA scoping
Construction Phase			
Demersal fish, shellfish, and nursery/spawning grounds	Temporary habitat loss and/or physical disturbance during cable trenching and laying	Yes	Construction activities could overlap (spatially and temporally) with key habitat, spawning or nursery areas.
Demersal fish, shellfish, and nursery/spawning grounds	Increased suspended sediments and sediment re-deposition	Yes	Suspended sediment has the potential to impair respiratory, filter feeding or reproductive functions, including the disruption of migration/spawning activity. Sediment deposition, especially if it changes the characteristics of the existing seabed sediments, could affect the quality of spawning and nursery habitats.
All groups (Particularly migratory species)	Barrier effects	Yes	Acoustic barrier effects (noting the potential presence of Annex II migratory species) may also arise as a result of underwater noise or physical disturbance during construction and will be included as part of the underwater noise assessment.
All receptor groups	Underwater noise	Yes	Underwater noise generated by pile driving and other construction activities may result in disturbance and displacement of fish species and have the potential to affect spawning behaviour, nursery areas and migration patterns.
Operational Phase			
All receptor groups	Permanent habitat loss	Yes	The presence of foundations on the seabed and cable protection would result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. Scoped in as footprint has not been defined
Demersal fish and shellfish	Cable operation causing an increase in temperature	No	Any cable heat is expected to rapidly dissipate and any heating of the seabed immediately surrounding the cables will therefore be only marginally elevated above background levels.
All receptor groups	Temporary habitat loss and/or physical disturbance	Yes	O&M activities could overlap (spatially and temporally) with key habitat, spawning or nursery areas
Demersal fish, shellfish, and nursery/spawning grounds	Increased suspended sediments and sediment re-deposition	No	Given limited amount of infrastructure, limited potential for increases via scour effects or from O&M activities

Receptor / Receptor Group	Potential Impact	Scoped into EIA	Rationale for EIA scoping
All receptor groups	Underwater noise	No	No material operational noise from the MOS platform, limited vessel traffic as MOS platform unmanned
All receptor groups	Interactions of EMF	Yes	The effects of EMF from the export cables to landfall may disrupt the migratory and foraging movements of fish, particularly elasmobranchs.
Decommissioning Phase			
All impacts scoped into the construction phase are scoped into the decommissioning phase. However, baseline conditions may have changed, especially around the platform as different ecological communities may have developed around the sub-surface structures. This will need to be understood to inform the final decommissioning approach. The magnitude of some types of effects is expected to be lower overall (e.g. noise impacts will no longer involve pile driving noise).			
Cumulative Impacts are scoped in for this receptor group			

6.3.5 Potential Mitigation

The requirement and feasibility of mitigation measures will be dependent on the significance of the effects on fish and shellfish ecology and nature conservation. The requirement and feasibility of any additional measures will involve consultation with statutory consultees throughout the EIA process. Mitigation measures will be developed as part of the design development and EcIA as an iterative design and appraisal process, focussed on the following key approaches:

- Consider the timing of works to avoid work in high intensity spawning areas at particular times of the year for demersal spawners;
- Consider whether it is feasible to avoid significant work in coastal areas during main migratory periods for certain migratory fish species (e.g. allis shad, sea trout, sea lamprey, river lamprey, and salmon);
- Production of a PEMP to ensure control measures are implemented to minimise risk to fish; and
- Project vessels to travel at a speed below 14 knots, with a fully briefed boat crew so that they are aware of collision risk with basking shark and can keep note of any sightings.
- Where seabed preparation is required (e.g. levelling) adoption of methods and equipment that have been designed to minimise potential for sediment suspension and dispersal.
- Selection of cable installation methods and equipment most suitable for seabed conditions and designed to minimise sediment suspension into the water column.
- Preparation of Construction Method Statements (CMS), post consent, setting out detailed MOS platform foundation and cable installation methods and techniques (based on final project design).
- Cables will be buried to a target burial depth of 1 m where possible (recognised industry good practice), thereby greatly reducing EMF levels at the surface of the seabed.
- Development and implementation of a Marine Mammal Mitigation Protocol (MMMP which will include proposals for soft start and ramp-up of piling. The MMMP will be agreed with key stakeholders prior to application. The soft start and ramp-up will allow sound-sensitive fish to move away from the area before sound levels reach thresholds at which injury or auditory shifts occur.

Potential mitigation measures will be consulted upon with stakeholders throughout the EIA process.

6.3.6 Environmental Assessment Approach

A desktop study will be undertaken, no site surveys are to be carried out specifically for fish and shellfish receptors. A key source of information will be fisheries landings data; these provide both large spatial coverage and effort. These datasets will be complimented with existing site-specific data available from nearby projects (e.g. Project Erebus[6]).

The impact assessment will be further informed by physical processes and geophysical and benthic data from the Project's benthic ecology assessments.

In addition, potential noise impacts will be informed by a site-specific noise modelling study (if, as expected, the final MOS platform design uses piling as a foundation installation method). The noise model outputs will be interpreted using fish impact threshold guidance from Popper et al., (2014).

[6] *https://www.bluegemwind.com/our-projects/erebus/*

6.4 Marine Mammals and Marine Reptile Ecology

6.4.1 Data and Information Sources

In line with NRW guidance, the sources to be used to inform the marine mammal baseline for the EIA are:

- Atlas of the Marine Mammals of Wales (Baines and Evans, 2012);
- Blue Gem Wind 'project Erebus' Floating Offshore Wind Farm: Environmental Impact Assessment Environmental Statement (Blue Gem Wind, 2021);
- Greenlink Marine Environmental Statement- Wales (Greenlink Interconnector Limited, 2019);
- The West Wales grey seal census 1992-1994. CCW Contract Science Report No. 131. Countryside Council for Wales, Bangor. (Baines et al., 1995)
- Small Cetaceans in the European Atlantic and North Sea (SCANS-III): Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond et al., 2021)
- The Joint Cetacean Protocol (JCP) Phase III report (Paxton et al., 2016)
- The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area (Heinänen and Skov, 2015)
- ObSERVE surveys (Rogan et al., 2018)
- Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt et al., 2019)
- Management Units for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2021)
- Seal telemetry data (e.g. Russel and McConnell 2014)
- UK seal at sea density estimates and usage maps (Russell et al., 2017; Carter et al., 2020)
- The Revised Welsh Marine Mammal Atlas, due to be published in 2023

6.4.2 Study Area

The study area for marine mammals and reptiles includes the Project Area (Figure 2.1), and extends 100 km around the Project Area to include designated sites important to marine mammals and reptiles, which may travel into or through the Project Area for various reasons, such as foraging and/or migration. Protected sites further than 100 km have not been considered as species from protected sites further away are unlikely to travel into the Project Area in high enough numbers for the population of qualifying species to be significantly impacted.

6.4.3 Existing Environment

Marine mammals present in the Study Area include cetaceans (whales, dolphins and porpoises) and pinnipeds (seals). Chelonians (marine turtles) are the only type of reptile that may be present (Hammond et al., 2008).

More than 28 cetacean species have been recorded in UK waters of which eleven occur regularly. Within the Irish and Celtic Sea, approximately fifteen species have been recorded and therefore may be encountered in the Study Area, at least on a seasonal basis. Table 6.7 lists species which are present in the area, and are expected to be taken forward for assessment. Other species which are rarely seen in the Study Area include, but are not limited to, the minke whale *Balaenoptera acutotostrata*, white-beaked dolphin *Lagenorhynchus albirostris*, killer whale *Orchinus orca*, long-finned pilot whale *Globicephala melas*, and humpback whale *Megaptera novaengliae*.

The harbour seal is widespread around the shores of the UK, but population density varies greatly from place to place with low numbers recorded at many sites. Sightings of the harbour seal within the Pembrokeshire SAC and surrounding area are infrequent and were therefore scoped out.

Grey seals utilising the area of the Pembrokeshire Marine SAC comprise the major proportion of an isolated breeding population, in which their breeding ecology differs from that of grey seals elsewhere. The population size estimates are approximately 5,000 individuals. Pupping time occurs primarily from August through to December. Grey seals can be found within the site all year and favour rocks to haul out, such as those present at in Milford Haven, Skomer and Skokholm.

Five species of turtle have been recorded in UK waters; however, the vast majority of these are of leatherback turtle *Dermochelys coriacea*. The Irish Sea is considered a through route for leatherbacks passing from South Ireland and South West England through to Northern Ireland and the west coast of Scotland. Leatherback turtles are most commonly observed around the UK and Ireland between June and October (peak abundances in August) and are regularly seen in the Project Area and surrounding area (Reeds, 2004).

Table 6.7 Marine Mammals and Reptiles within the Study Area that will be taken forward for assessment

Species	Protection Status[7]	Distribution within Study Area / frequency of sightings	Importance
Cetaceans			
Harbour porpoise *Phocoena phocoena*	Berne; CITES; CHR; WCA; SPI; OSPAR CMS; HD	Highly mobile species found throughout the Study Area and beyond, extending into the mid-Bristol Channel and the Celtic Sea, along the Pembrokeshire coast and within Milford Haven (JNCC, 2022a). Common from June through to autumn/ winter. Peak period in August. Seawatch Foundation states that there are regular/common sightings of this species in the Study Area. **Primary qualifying feature for: Bristol Channel Approaches SAC; and West Wales Marine SAC**	International
Common bottlenose dolphin *Tursiops truncatus*	Berne; CITES; CHR; WCA; SPI; CMS; HD	Highly mobile species found within the Study Area, however not in the immediate Project Area location (MarLIN, 2022). Common year round but most frequent in summer. **Primary qualifying feature for: Cardigan Bay SAC.** **Qualifying feature for: Llyn Peninsula and the Sarnau SAC.**	International
Short-beaked common dolphin *Delphinus delphis*	Berne; CITES; CHR; WCA; SPI; CMS	Common sightings of this species within the Study Area. Peak period is spring and summer with a winter peak on the coast and islands off west Pembrokeshire, which is associated with the timing and presence of prey items.	International

[7] *Berne: Berne Convention; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora; CHR: UK Conservation of Habitat and Species Regulations; WCA: UK & NI Wildlife & Countryside Act; ; SPI: Species of Principal Importance; OSPAR: OSPAR Annex V List; IUCN: IUCN Redlist;; CMS: Convention of Migratory Species.*

Species	Protection Status[7]	Distribution within Study Area / frequency of sightings	Importance
Minke whale *Balaenoptera acutorostrata*	As per short-beaked common dolphin	Highly mobile species, rarely found within the Study Area, with <1 sighting per year in the Study Area (MarLIN, 2022).	International
Humpback whale *Megaptera novaengliae*	As per short-beaked common dolphin	Highly mobile species, rarely found within the Study Area, with <1 sighting per year in the Study Area (MarLIN, 2022).	International
Fin whale *Balaenoptera physalus*	Berne; CITES; CHR; WCA; SPI; IUCN	Highly mobile species, rarely found within the Study Area, with <1 sighting per year in the Study Area (MarLIN, 2022).	International
Pinnipeds			
Grey seal *Halichoerus grypus*	Berne; HD; WCA; CMS; CHR	Grey seals are present all around the UK coastline, with known colonies found within Pembrokeshire Marine, Skomer, Lundy Island, Saltee Islands, Cardigan Bay and Llyn Peninsula SACs. Grey seal annual pup production on the west coast of Pembrokeshire is high, with 300-400 pups produced around Skomer Island and the same amount around other nearby islands between 1994 and 2001 (CCW, 2012). There are also numerous haul out sites around the Pembrokeshire peninsula, mainly off the coast of St. David's, with 50 to 150 non-breeding haul out counts between 1990 and 2007. **Primary qualifying feature for: Pembrokeshire Marine SAC; Saltee Island SAC.** **Qualifying feature for: Lundy Island SAC; Cardigan Bay SAC; Llyn Peninsula and the Sarnau SAC; Arfordir Abereiddi SSSI; Dale and St. Marloes Coast SSSI; Grassholm SSSI; The Offshore Islets of Pembrokeshire SSSI; Ramsey SSSI; Skokholm SSSI; Skomer Island and Middleholm SSSI; St. David's Peninsula Coast SSSI.**	International
Marine Reptiles			
Leatherback turtle *Dermochelys coriacea*	CITES; HD; WCA; Section 7 species; OSPAR; IUCN (Vulnerable); CMS	Increasingly common within the Study Area, and generally inhabits open seas. Leatherbacks extensive migrations into British waters are thought to follow swarms of jellyfish which are the leatherbacks main prey item (Reeds, 2004). There are no nesting beaches in the UK (Ellis et al., 2010).	International

6.4.4 Potential Impacts

The potential impacts of the proposed Project on marine mammals and retile ecology are set out in Table 6.8.

Table 6.8 Summary of Key Sensitivities and Potential Impacts for Marine Mammals and Reptile Ecology

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
All marine mammals	Increased levels of underwater noise (foundation installation, cable laying, vessels)	Yes	Underwater noise has a range of potential impacts on marine mammals (including Permanent Threshold Shifts (PTS), Temporary Threshold Shifts (TTS), disturbance and behavioural effects, impacts on prey species and barrier effects). These will all be assessed in the EIA, considering the most recent and robust research, guidance and information available.
Marine reptiles	Increased levels of underwater noise (foundation installation, cable laying, vessels)	Yes	Noise impact thresholds for turtles do exist (Popper at al., 2014), therefore this impact will be scoped in and assessed according to this available guidance.
All marine mammals	Increased levels of underwater noise (UXO clearance)	No	Underwater noise modelling will be undertaken for the clearance of UXO. However, any UXO clearance, if required, will be assessed as part of a separate Marine Licence (post-consent). This is due to the detailed survey work required to identify the number and location of potential UXO being carried out post-consent. Therefore, worst-case scenario impact ranges per UXO clearance will be included as an Appendix within the Project Environmental Statement for information only as a detailed UXO clearance impact assessment will be carried out at a later date.
All marine mammals and reptiles	Collision risk from vessels within the Study Area	Yes	Shipping collision is a recognised cause of marine mammal mortality. This will be considered further in the EIA

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
All marine mammals and reptiles	Unplanned/accidental release of pollutants or chemicals into the water column from work vessels	No	All vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environment Management Plan (PEMP) will also be produced post-consent and implemented to cover the construction and operation and maintenance phases of the Project. This will set out all procedures and measures (in the form of a Marine Pollution Contingency Plan (MPCP)) to be taken during construction and operation to minimise the risk of, and subsequently manage in the event of an accidental spill. The PEMP will be developed in consultation with key stakeholders for approval by NRW. This embedded mitigation is routinely viewed as sufficient with the impact not assessed further in the EIA process.
All marine mammals and reptiles	Increased suspended sediment concentrations and subsequent deposition	Yes	Increased sedimentation may impact on benthic habitat and fish and shellfish receptors, thereby indirectly impacting marine mammals and reptiles via changes in prey availability. This impact is therefore now scoped into the EIA. However, it will be assessed as 'Changes to prey resources' and will be informed by the overall findings of the EIA for fish and shellfish, and benthic receptors.
All marine mammals and reptiles	Changes to prey resource	Yes	As mentioned above, the findings of the fish and shellfish EIA will be used to inform an assessment of changes to prey resource for marine mammals and reptiles.
Pinnipeds	Presence of project vessels near the coast could cause physical disturbance to seals at haul out sites	Yes	The risk of nearby work vessels causing 'flight reactions' of breeding and moulting seals remains.
Operational Phase			
All marine mammals and reptiles	Physical barrier effects	No	Given to the relatively small footprint of the MOS platform, there is no pathway for meaningful barrier effects to occur
All marine mammals and reptiles	Underwater noise	No	No material operational noise from the MOS platform, limited vessel traffic as MOS platform unmanned
All marine mammals and reptiles	Collision risk from vessels and machinery within the Study Area	No	Limited vessel traffic as MOS platform unmanned and with a single MOS platform there is limited potential for maintenance (planned or unplanned)

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
All marine mammals and reptiles	Increased suspended sediment concentrations and subsequent deposition	No	Given limited amount of infrastructure, limited potential for increases via scour effects or from O&M activities
All marine mammals and reptiles	Unplanned/accidental release of pollutants or chemicals into the water column from work vessels	No	As per construction
Pinnipeds	Presence of project vessels near the coast could cause physical disturbance to seals at haul out sites	Yes	The risk of nearby work vessels causing 'flight reactions' of breeding and moulting seals.
Cetaceans and pinnipeds	Emission of EMF during operation of the Project could cause interference/disruption to cetacean navigation.	No	No evidence exists of marine cable EMF effects on marine mammals. Once installed, operational EMF impacts are unlikely to be of sufficient range or strength to directly impact marine mammals. This is consistent with other recent projects (including for Norfolk Vanguard and Norfolk Boreas (Planning Inspectorate 2016; 2017b), East Anglia ONE North and East Anglia TWO (Planning Inspectorate 2017c; 2017d), and both the Dudgeon Extension and Sheringham Shoal Extension Projects (Planning Inspectorate; 2019)) as there is no evidence of any impact.
Decommissioning Phase			
All impacts scoped into, and out of, the construction phase will be similarly scoped in the decommissioning phase. However, baseline conditions may have changed, especially around the platform as different ecological communities may have developed around the sub-surface structures, and this may affect the residency of marine mammals in the area. There may also be changes in distribution ranges of marine mammals over the lifetime of the PDZ MOS due to changing climate conditions. This will need to be understood to inform the final decommissioning approach.			
Cumulative Impacts are scoped in for this receptor group			

6.4.5 Potential Mitigation

The requirement and feasibility of mitigation measures will be dependent on the significance of the effects on ecology and nature conservation. The requirement and feasibility of any additional measures will be consulted upon with statutory consultees throughout the EIA process. Mitigation measures will be developed as part of the design development and EIA as an iterative design and appraisal process, focussed on the following key approaches:

- Marine mammal observers to be used as required (e.g. construction phase);
- Incorporation and consideration of JNCC guidance where necessary (e.g. during construction) and guidance on geophysical surveys); and
- Project vessels to travel at a speed below 14 knots, with a fully briefed boat crew so that they are aware of collision risk.

In addition to the above mitigation, it is proposed that a more detailed Marine Mammal Mitigation Protocol (MMMP) will be produced to reduce the risk of physical injury or permanent auditory injury (PTS) in marine mammals from underwater noise during construction. A draft MMMP will be provided as an appendix to the EIA Report.

The requirement and feasibility of any additional measures will be consulted upon with statutory consultees throughout the EIA process. Mitigation measures will be developed, adapted and refined as part of the design development process. Examples of additional measures that could be considered include (noting that more options may be available in the future):

- Use of Acoustic Deterrent Devices (ADDs) to ensure marine mammals are not within any potential permanent auditory injury zone
- Lower impact methods of construction, such as low-order detonation for UXO, alternate foundations and piling installation techniques; and
- Seasonal restrictions/timing considerations for noisy activities

6.4.6 Environmental Assessment Approach

As agreed through consultation with NRW marine mammal specialists, the marine mammal baseline environment will be characterised using a desktop study, utilising the data sources outlined in **Section 6.4.1**. The desktop study, which will characterise the density and distribution of marine mammal species within the Study Area, will be combined with a dedicated underwater noise modelling study to determine the worst-case noise impacts associated with the Project.

6.5 Terrestrial Ecology

This section describes the terrestrial ecology baseline environment and potential effects associated with the construction, operation and decommissioning of the Project. For this scoping report, 'terrestrial' is defined as habitats and species present above the MHWS. Habitats and species below MHWS, including intertidal habitats, are considered in Section 6.2 Benthic, Subtidal and Intertidal Ecology. Bird species are considered in Section 6.6, Ornithology. Potential effects on the conservation status of protected sites - which may be a combination of effects on marine, coastal, terrestrial and ornithology features - are considered in Section 6.1. Effects on terrestrial species and habitats that are also qualifying feature of one or more protected sites are, however, considered in this chapter.

6.5.1 Data and Information Sources

Baseline data for the EIA will be reviewed from the sources provided within this section. In addition, consultation with relevant stakeholders (see Section 1.4) will be carried out and considered as appropriate.
Key data about habitats and species used to inform this section include:

- Terrestrial Phase 1 Habitat Survey for Wales (completed in 1997 by CCW; digital data downloaded from NRW);
- Ancient woodland inventory using information held in the LLE Geo-portal for Wales;
- Local Biodiversity Action Plan for Pembrokeshire (Pembrokeshire Biodiversity Partnership, 2011);
- The Nature Recovery Action Plan for Pembrokeshire (Pembrokeshire Nature Partnership, 2018). This follows on from the Local Biodiversity Action Plan for Pembrokeshire. It includes an updated list of Section 7 (of the Environment (Wales) Act (2016)) Species known to occur in Pembrokeshire.
- The Seascape Character Assessment: Interim Supplementary Planning Guidance Local Development Plan 2 NPA September 2020 (this updates the Seascape Character Assessment 2013 to reflect latest national planning policy including the Wales National Marine Plan and local development plan policy (PCNPA, 2020; PCNPA, 2022).

Internationally and nationally designated sites were identified using the MAGIC online geographical information system and the LLE Geo-portal for Wales. Local Nature Reserves and SINCs / Wildlife Sites were identified by reviewing the Wildlife Trust of South & West Wales website and the Royal Society for the Protection of Birds (RSPB) website.

Features of conservation interest for internationally designated sites were identified from the Natura 2000 standard data forms published by the JNCC. The features of conservation interest for SSSIs were identified from Citations and Site Management Statements published by NRW. Information on National Nature Reserves (NNRs) was attained from information on the websites of applicable reserve management organisations (National Trust, RSPB, and Wildlife Trust of South & West Wales).

6.5.2 Study Area

The terrestrial ecology Study Area is based on the six export cable landfall site options (see also Section 2.3.5) and the potential routes for the onshore cables to reach the grid connection. The Study Area boundary extends 5 km east from the Freshwater East landfall option and 3.5 km west (to the coastline) from the Freshwater West landfall option to consider potential indirect effects on mobile species such as bats (Figure

2.1). It is not expected that onshore cable routes will be installed as far to the east or west as the Study Area boundaries.

6.5.3 Existing Environment

6.5.3.1 Habitats

The main terrestrial habitats of the Castlemartin Peninsula are summarised in Table 6.9 and shown on Figure A6.4.1 (Appendix A). This table also states where a habitat is an interest feature of a designated site.

Table 6.9 Summary of Terrestrial Habitats on the Castlemartin Peninsula

Habitat	Protection Status	Distribution within Study Area	Importance
Sand dunes (incl. fixed, mobile & dune slacks)	Annex I Habitat. Section 7 Habitat.	There are two main areas of sand dune: an approximately 4km long extent behind the sandy beaches on the west coast between Freshwater West and Frainslake Sands, including Broomhill, Brownslade, Kilpaison and Linney burrows; and an approximately 1.8 km long extent around Stackpole. Both areas are within protected sites. **Qualifying feature of: Limestone Coast of SW Wales SAC; Castlemartin Range SSSI; Broomhill Burrows SSSI.**	International (as a feature of a European Site)
Vegetated sea cliffs and slopes	Annex I Habitat. Section 7 Habitat.	Limestone sea cliffs are present around most of south coastline of the Castlemartin Peninsula between Stackpole and the entrance to Milford Haven, except where there are bays with sand dunes. The slopes above the cliff faces support a band of maritime grassland. All areas are within a protected site. **Qualifying feature of: Limestone Coast of SW Wales SAC; Castlemartin Range SSSI; Stackpole Quay – Trewent Point SSSI; Freshwater East Cliffs to Skrinkle Haven SSSI.**	International
Maritime and dry and heath	Annex I Habitat. Section 7 Habitat.	Areas of maritime heath are present behind the cliff top maritime grassland. All areas are within a protected site. **Qualifying feature of: Limestone Coast of SW Wales SAC; Castlemartin Range SSSI; Stackpole Quay – Trewent Point SSSI; Freshwater East Cliffs to Skrinkle Haven SSSI.**	International
Calcareous grassland	Annex I Habitat. Section 7 Habitat.	Areas are mainly found within the coastal fringe of the southern coastline (e.g. behind maritime grassland and heaths), but there are some areas further inland. All areas are within a protected site. **Qualifying feature of: Limestone Coast of SW Wales SAC; Castlemartin Range SSSI.**	International

Habitat	Protection Status	Distribution within Study Area	Importance
Neutral unimproved grassland (lowland meadows)	Section 7 Habitat.	There is extensive band of this habitat across the south of the Castlemartin Peninsula stretching between the sand dunes at Frainslake Sands and Stackpole, extending by between 1 km and 3 km inland from maritime grassland. Scattered areas are also present within the improved grasslands further north. **Qualifying feature of: Castlemartin Range SSSI; Gweunydd Somerton Meadows SSSI.**	National (as a feature of a nationally designated site)
Improved grassland	None; but field margins are a Section 7 Habitat.	Improved grassland (pasture) dominates habitats between the belt of neutral grassland in the south and the north coast of the peninsula. Extent of field margins is not currently known.	Regional (field margins only)
Cultivated land	None; but field margins are a Section 7 Habitat.	Areas of cultivated land are present within the central belt of improved grassland.	Regional (field margins only as a Section 7 habitat)
Wetlands	Section 7 Habitat.	Areas of swamp, fen and marsh are present across the Castlemartin Peninsula, notably at Martin's Haven / Pwllcrochan immediately west of Pembroke Power Station; Castlemartin Corse situated behind sand dunes at Freshwater West / Broomhill Burrows; and Frainslake valley situated behind sand dunes at Linney and Brownslade Burrows. **Qualifying feature of: Castlemartin Range SSSI; Milford Haven Waterway SSSI; Castlemartin Corse SSSI.**	National
Semi-natural broadleaved woodland	Section 7 Habitat.	Scattered areas across the peninsula, including some ancient woodland. Notable areas are ancient woodland dominated by sessile oak on the fringes areas of the main Milford Haven channel; along wetland/ watercourse valleys connected to Milford Haven; Bosherton Lakes / Stackpole; and, Orielton. **Qualifying feature of: Milford Haven Waterway SSSI; Stackpole SSSI.**	National
Ponds and lakes	Annex I Habitat (Calcium-rich, nutrient-poor lakes). Section 7 Habitat.	The main area is Bosherton lakes, adjacent to Stackpole. Scattered smaller lakes and ponds across the peninsula. **Qualifying feature of: Pembrokeshire Bat Sites and Bosherton Lakes SAC; Stackpole SSSI.**	International (Bosherton Lakes) Regional (others)

Habitat	Protection Status	Distribution within Study Area	Importance
Streams and rivers	Section 7 Habitat.	Watercourses flow into the sandy bays on the west coast, notably via the Castlemartin Corse catchment (see Figure A5.5.1, Appendix A), and into Milford Haven, including Pembroke River. May be hydrologically connected to protected wetland and dune slack habitats, especially at Castlemartin Corse.	Regional
Roadside verges	Section 7 Habitat.	Network of B- and unclassified roads may offer roadside verge habitats.	Regional
Industrial / built up areas	None.	The four main areas all in the north of the peninsula: Oil Refinery, Pembroke Power Station, Pembroke Dock and Pembroke. Smaller communities scattered across the peninsula.	Negligible

6.5.3.2 Species

The habitats summarised in Table 6.9 support a large number of fauna and flora that are protected under international and/or national legislation; that are part of assemblages that form interest features for a protected site; and/or, that are Section 7 species. These include rare and notable bryophytes, lichen, fungi, vascular plants, invertebrates, reptiles and amphibians as well as mammals. All of these could constitute 'important' ecological features for a future EcIA.

It is not practical to list and describe the distribution of all protected and notable species that are known to be, or that have potential to be, present in the Study Area. For the purposes of this scoping report, only species that are listed as specific interest features of protected sites in the Study Area are summarised, as these are known to be present and represent the greatest likely constraints (Table 6.10).

It is recognised that this is not an exhaustive list of potentially important species in the Study Area, and it does not include all potentially important species present within protected site boundaries or listed in the Nature Recovery Action Plan for Pembrokeshire. The species that need to be considered by a future EcIA will be refined as the Project design develops and cable route optioneering is refined.

Table 6.10 Terrestrial Species that are Interest Features of Protected Sites in the Project Area

Species	Protection Status	Distribution within Study Area	Importance
Fauna			
Great and lesser horseshoe bats *Rhinolophus hipposideros; R. ferrumequinum*	Annex II & IV Species. Schedule 5 Species (full protection)	Numerous roosting and foraging sites across the Castlemartin Peninsula, including: Castlemartin Range (foraging over grassland, night and winter roosts in caves, bunkers and buildings); Orielton field centre and buildings (incl. lesser horseshoe nursery roost); various buildings around Stackpole (including nursery roosts); semi-natural habitats fringing Milford Haven Waterway (foraging, daytime and night-feeding roosts, winter hibernacula); Carew Castle and grounds (roosting and foraging habitat),.	International
Brown long-eared bat *Plecotus auritus*	Annex IV Species. Schedule 5 Species (full protection)	Known to roost at Orielton field centre and buildings at Stackpole and to roost and forge at Carew; other foraging areas uncertain.	International
Myotis bat species *Myotis nattereri*; *M. daubentonii; M. mystacinus; M. brandtii*	Annex IV Species. Schedule 5 Species (full protection)	Known to roost at Orielton field centre (*Myotis mystacinus*) and buildings at Stackpole (all species); several species roost and forage at Carew Castle; other foraging areas uncertain.	International
Common pipistrelle *Pipistrellus pipistrellus*	Annex IV Species. Schedule 5 Species (full protection)	Known to roost at buildings at Stackpole and to roost and forage at Carew Castle; other foraging areas uncertain.	International
Otter *(Lutra Lutra)*	Annex II & IV Species. Schedule 5 Species (full protection)	Associated with coastal wetland habitats around the peninsula and at Bosherton Lakes; distribution in Study Area uncertain.	International
Brown hair-streak butterfly *Thecla betulae*	Schedule 5 Species (sale only) Section 7 Species.	Known to be present on blackthorn scrub within Milford Haven SSSI; detailed distribution uncertain.	National
Silver-studded blue butterfly *Plebejus argus*	Schedule 5 Species (sale only) Section 7 Species.	Known to be present in sheltered herb-rich sandy hollows at Stackpole; detailed distribution uncertain.	National
Flora			
Early gentian *Gentianella anglica*	Habitats Directive Annex II & IV. Schedule 8 Species.	Dunes and coastal grassland at Stackpole support the only known population in Wales.	International

Species	Protection Status	Distribution within Study Area	Importance
Petalwort *Petalophyllum ralfsii*	Habitats Directive Annex II. Schedule 8 Species.	Typically grows in open, damp, calcareous dune slacks; distribution in Study Area uncertain.	International
Fen Pondweed *Potamogeton coloratus*	Not protected, but nationally scarce; decline linked to wetland drainage.	Known to be present in ditches in the fen meadow in Castlemartin Corse, and in dune pools in Frainslake valley.	Local
Small restharrow *Ononis reclinata*	Schedule 8 Species.	Range restricted to SW Britain, associated with limestone cliffs, growing on sheltered ledges and crevices on low- sloping outcrops. Distribution in Study Area uncertain	National
Marsh pea *Lathyrus palustris*	Not protected, but nationally scarce; decline linked to wetland drainage.	Feature of Milford Haven Waterway SSSI. Associated with fens, marshes and reed beds, but distribution in Study Area uncertain.	Local
Spurge-laurel *Daphne laureola*	Not protected.	Feature of Milford Haven Waterway SSSI, occurring on the scrub-dominated low calcareous cliffs around Pembroke River.	Local
Wayfaring tree *Viburnum lantana*	Not protected.	Feature of Milford Haven Waterway SSSI, occurring on the scrub-dominated low calcareous cliffs around Pembroke River.	Local

6.5.4 Potential Impacts

The potential impacts (changes to the environment) and effects (resultant consequences for a habitat or species) of the Project on important habitat and species features are summarised in Table 6.11 and Table 6.12. The impacts on terrestrial habitats (and species using those habitats) would occur during construction, but the effects could continue through the operation and maintenance phase if affected habitats cannot be restored. It is assumed that all onshore cables will be installed below ground with minimal operational maintenance needs for cables or transition equipment. Impacts could arise during decommissioning if redundant onshore infrastructure is removed, for example cable transition equipment, but it is assumed that below ground cabling would be safely disconnected but not removed.

Table 6.11 Summary of Key Sensitivities and Potential Impacts for terrestrial habitats

Receptor Habitat	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Sand dunes (incl. fixed, mobile & dune slacks	Excavations and temporary working areas to install cables and transition pit at landfall site. Direct harm to and loss of dune habitats and associated species, affecting conservation status during construction and deconstruction.	Yes (Freshwater West, Broad Haven South, Freshwater East)	Dune habitats are features of SAC and SSSI sites. The physical structures of dune systems are vulnerable to disturbance and dunes are typically slow to recover from damage.
Vegetated sea cliffs and slopes (above MHWS – see Section 6.1 for sea caves)	Drilling or trenching through limestone cliffs during construction (and deconstruction) to install cables and transition pits at landfall site, depending on alignment of cables. Direct harm to and loss of ledges/crevices and associated flora and fauna, direct loss and damage to cliff top (maritime) grassland; and, damage to cave habitats.	Yes (Freshwater West, Bullslaughter Bay, New Quay Beach, Broad Haven South, Greenala Point)	Cliff habitats are features of SAC and SSSI sites. Damage to caves / ledge structures would be irreversible; cliff vegetation is usually slow growing and would not recover quickly. It may be possible to avoid any effects by using Horizontal Directional Drilling (HDD) to install cables and selecting appropriate launch sites, but this cannot be confirmed at this stage.
Maritime and dry heath; Calcareous grassland	Excavations and temporary working areas to install cliff-top cables and transition pits at landfall site. Direct harm to and loss of grassland and heath, affecting conservation status.	Yes (Freshwater West, Bullslaughter Bay, New Quay Beach, Broad Haven South, Greenala Point)	Maritime heath and calcareous grassland habitats are features of SAC and SSSI sites. Habitats do not recover quickly following damage or disturbance. It may be possible to avoid any effects by using HDD to install cables and selecting appropriate launch sites, but this cannot be confirmed at this stage.
Neutral unimproved grassland (lowland meadows)	Excavations and temporary working areas to install onshore cables from landfall site to the grid connection. Direct harm to and loss of grassland, affecting conservation status.	Yes (Bullslaughter Bay, New Quay Beach, Broad Haven South)	Unimproved grassland is a feature of SSSI sites and is sensitive to disturbance. Onshore cabling from Bullslaughter Bay, New Quay Beach and Broad Haven South could pass through neutral grassland habitat.

Receptor Habitat	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Field margins	Excavations and temporary working areas to install onshore cables (all landfall site options). Direct harm to and loss of margins and habitat fragmentation affecting conservation status.	Yes	Field margins are a Section 7 habitat. Not known at this stage how many field margins would be affected; the types and quality of habitat they provide; the potential for margins to support species features; or, their connectivity to other habitats. May be possible to successfully reinstate.
Wetlands	Cables crossing watercourses connected to wetlands. Indirect harm through e.g. pollution incident or flow changes in connected watercourse.	Yes (Freshwater West)	Wetlands are a Section 7 habitat. Assumes that a landfall and related onshore cabling at Freshwater West would be able to avoid direct effects to wetlands at Castlemartin Corse, but indirect effects may need to be considered.
Semi-natural broadleaved woodland	Cable routes between landfall site and grid connection could affect woodland areas. Loss of deciduous trees and associated woodland habitat and species.	Yes (New Quay Beach, Broad Haven South, Freshwater East, Greenala Point)	Broadleaved woodland is a Section 7 habitat, that does not recover quickly following damage or disturbance. Notable areas of ancient woodland (considered irreplaceable) are present within potential cabling routes from New Quay Beach near Bosherton, Broad Haven South within Stackpole, and Freshwater East landfall site options.
Ponds and lakes	Potential impacts on Bosherton Lakes and tributaries from cable routes between landfall site and grid connection.	Yes (New Quay Beach, Broad Haven South, Greenala Point, Freshwater East)	Ponds and lakes are an Annex I (calcium-rich, nutrient-poor lakes) and Section 7 habitat. Cable routes have potential to go close to Bosherton Lakes. Although onshore cable routes can be selected to avoid directing affecting standing waterbodies, indirect effects may need to be considered.

Receptor Habitat	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Streams and rivers	Temporary working (e.g. coffer dams, adjacent excavations) to install onshore cables across watercourses (all landfall site options). Temporary damage to habitats affecting their conservation status; potential pollution release, potential effects on connected wetland habitats.	Yes	Streams and Rivers are a Section 7 habitat, and it is not known at this stage whether it would be possible for cable routes to avoid watercourse crossings, or to avoid directly affecting watercourses when installing a crossing. Potential in-combination effects with wetland habitats, and ponds and lakes.
Roadside verges	Excavations and temporary working areas to install onshore cables (all landfall site options). Direct harm to and loss of margins and habitat fragmentation affecting conservation status.	Yes	Road verges are a Section 7 habitat. Not known at this stage how many verges would be affected; the types and quality of habitat they provide; the potential for margins to support species features; or, their connectivity to other habitats. May be possible to successfully reinstate.
Operation Phase			
All habitats	It is assumed there will be minimal operational maintenance needs for cables and transition equipment, and that access to transition equipment at landfill sites will be via routes established during construction.	No	No activities that could result in potentially significant impacts during operation.
Decommissioning Phase			
All habitats	Removing transition equipment could cause disturbance, damage and loss of habitats. It is assumed that below ground cabling would be safely disconnected but not removed.	Yes	Potential impacts would likely be to the same habitats affected by construction. However, the baseline may have changed between construction and decommissioning meaning further survey and assessment would be required.
Cumulative Impacts are scoped in for this receptor group			

Table 6.12 Summary of Key Sensitivities and Potential Impacts for protected and scarce terrestrial ecology species

Receptor Species	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Greater and lesser horseshoe bats	Drilling or trenching through limestone cliffs to install cables and transition pit at landfall site. Installation of onshore cables close to buildings and bunkers in MoD Castlemartin range and buildings as well as both Stackpole SSSIs and at Orielton. Installation of onshore cables through linear habitat and navigation features (e.g. hedgerows), and damage to foraging habitat. Potential for damage and disturbance to roost sites.	Yes	Damage and disturbance to roost sites, disruption of navigation features, changes to foraging habitat, collisions and resultant mortality could affect breeding success and conservation status of horseshoe bat populations. No direct effects on the roosts at Stackpole, Orielton or Carew Castle are predicted. It may be possible to avoid any potential effects on limestone cave roosts by using HDD to install cables, but this cannot be confirmed at this stage.
Brown long-eared bat	Installation of landfall sites and onshore cabling (all landfall options) affecting potential roosting and foraging habitat, including linear features. Potential for damage and disturbance to roost sites.	Yes	Damage and disturbance to roost sites, disruption of navigation features, changes to foraging habitat, collisions and resultant mortality could affect breeding success and conservation status of brown long-eared bat populations. No direct effects on the roosts at Stackpole, Orielton or Carew Castle are predicted.
Myotis bat species	As per brown long-eared bat.	Yes	As per brown long-eared bat.
Common pipistrelle	As per brown long-eared bat.	Yes	As per brown long-eared bat.
Hazel dormice	Installation of landfall sites and onshore cabling (all landfall options) affecting potential habitats suitable for hazel dormice.	Yes	Distribution in Castlemartin Peninsula not known, but there are records east of Pembroke. Damage and disturbance to nesting sites and changes to foraging habitat could affect breeding success and conservation status of hazel dormice.

Receptor Species	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Otter	Installation of landfall sites and onshore cabling at landfall options through coastal habitats potentially used by otter. Potential for disturbance to foraging and for holts to be damaged or disturbed.	Yes (Freshwater West, New Quay, Broad Haven South, Greenala Point, Freshwater East)	Although effects would likely be temporary, the distribution of otter in the Study Area is not known at this stage, and so it is not possible to rule out the potential for important habitats or significant numbers of otters to be affected affecting conservation status.
Brown hair-streak butterfly	No effects on the habitats where this species occurs in Milford Haven SSSI.	No	No cable route options would need to pass through the blackthorn scrub within Milford Haven SSSI where this species occurs.
Silver-studded blue butterfly	Installation of landfall sites and onshore cabling could affect potential habitats suitable for silver-studded blue butterfly.	Yes (Broad Haven South)	Potential for Broad Haven South landfall option route to pass through supporting habitats at Stackpole where this species occurs.
Early gentian	Installation of landfall sites and onshore cabling could cause direct loss of plants and reduction in habitat quality.	Yes (Broad Haven South)	Potential for Broad Haven South landfall option route to pass through supporting habitats at Stackpole where this species occurs.
Petalwort	Installation of landfall sites and onshore cabling could affect dune slack habitat. Direct loss of plants and reduction in habitat quality.	Yes (Freshwater West, Broad Haven South, Freshwater East)	Although it may be possible for landfall site and cable routing to avoid affecting the supporting habitat, at this stage it is not possible to rule out the potential for significant effects.
Small restharrow	Drilling or trenching through limestone cliffs to install cables and transition pit at landfall site. Direct loss of plants and reduction in habitat quality.	Yes (Freshwater West, Bullslaughter Bay, New Quay, Broad Haven South)	Supporting habitat distribution means it may be possible to avoid any effects by using HDD to install cables and selecting appropriate launch sites, but this cannot be confirmed at this stage.
Marsh pea	No effects on habitats where this species occurs in Milford Haven SSSI.	No	No cable route options would need to pass through the wetland habitats around Milford Haven this species occurs.

Receptor Species	Potential Impacts / Effects	Scoped into EIA?	Rationale for EIA scoping
Spurge-laurel	No effects on habitats where this species occurs in Milford Haven SSSI.	No	No cable route options would need to pass through the low calcareous cliffs around Pembroke River where this species occurs.
Wayfaring tree	No effects on habitats where this species occurs in Milford Haven SSSI.	No	No cable route options would need to pass through the low calcareous cliffs around Pembroke River where this species occurs.
Fen pondweed	Potential reduction in habitat quality from changes in hydrology or water quality in upstream catchment from cable crossings.	Yes (Freshwater West, Bullslaughter Bay, New Quay, Broad Haven South, Greenala Point)	Nationally scarce with decline linked to wetland drainage. Onshore cable routes would not need to pass through wetlands at Castlemartin Corse or Frainslake valley, but cable routes from Freshwater West, Bullslaughter Bay, New Quay and Broad Haven South landfall options could cross watercourses within the upstream catchment.
Operation Phase			
All species	It is assumed there will be minimal operational maintenance needs for cables and transition equipment, and that access to transition equipment at landfill sites will be via routes established during construction.	No	No activities that could result in potentially significant impacts during operation.
Decommissioning Phase			
All species	Removing transition equipment could cause disturbance, direct harm and damage to species, and cause the loss of supporting habitats. It is assumed that below ground cabling would be safely disconnected but not removed.	Yes	Potential impacts would likely be to the same species as affected by construction. However, the baseline may have changed between construction and decommissioning meaning further survey and assessment would be required.
Cumulative Impacts are scoped in for this receptor group			

6.5.5 Potential Mitigation

Mitigation measures will be developed as part of design development and EcIA as an iterative design and appraisal process, focussed on the following key tasks:

- Develop the final design of onshore works to avoid working in protected sites, and affecting other important features, wherever possible;
- Where it is not possible to avoid a protected site, carry out detailed ecology surveys and liaise with regulatory authorities to identify the locations of the protected features within the site, and design the works to avoid those features;
- For horseshoe bats in particular, liaise with regulatory authorities and carry out ecology surveys to identify key habitat features, linear navigation corridors and foraging areas, and design the onshore works to avoid those wherever possible;
- Consider construction techniques to avoid directly affecting important features, e.g. using HDD to install cables at landfall points and where crossing other linear constraints such as watercourses; and
- If it is not possible to avoid affecting important features, develop construction and operation mitigation measures, e.g. timing of works, techniques and working areas to minimise effects, agree reinstatement of temporary works with regulatory authorities, offsetting or enhancement measures.

6.5.6 Environmental Assessment Approach

Following consultation and agreement with regulators, Project development work will be carried out to identify technically viable onshore cable route corridors between the potential landfall sites and the grid connection. Ecology walkover surveys and liaison with statutory authorities will be carried out of those corridors to identify key ecological constraints to support the selection of a preferred cable route corridor.

It is currently proposed that a Preliminary Ecological Appraisal (PEA) for the preferred landfall site, onshore substation(s) and onshore cable corridor be prepared to refine the potential for adverse effects on terrestrial ecology and set out the scope for an EcIA. The PEA would set out the detailed ecology surveys needed to refine the proposed route; to support an EcIA; to support an HRA; and, to support any protected species mitigation licences that may be necessary. The PEA would be used to consult with regulatory authorities to seek their agreement on the proposed surveys and the scope of detailed assessments.

Table 6.13 summarises the data and surveys that are likely to be needed to inform Project design, appraisal and consenting. Dormice surveys have been included in response to previous scoping consultation with NRW, and the potential to use the UK Habitat Classification system instead of a Phase 1 Habitat Survey to map habitats is proposed for further discussion.

Table 6.13 Proposed Data Collection for Terrestrial Ecology

Data Requirement	Method	Purpose / Rationale
Desk Study		
Existing records of protected and notable species and habitats, including freshwater fish, and designated sites.	Biological Records Centre data request. Consultation with NRW, Pembrokeshire Biodiversity Partnership, Wildlife Trust of South & West Wales and the National Trust.	Identify presence and previously recorded locations of protected and notable species and habitats. Confirm all statutory and non-statutory designated sites have been identified.
Surveys		
Broad habitat types and potential protected species within potential onshore works areas (landfall, substations, cable corridors).	Ecology walkover survey: • Extended Phase 1 Habitat Survey, or • UK Habitats Classification Survey. Method to be agreed with statutory stakeholders.	Provide a map of broad habitat types, updating the Phase 1 Habitat Survey of Wales used for this Scoping Assessment. Identify potential presence of protected species. Inform selection of onshore cable route corridor and enable design work to avoid important features where possible. Identify the scope of detailed surveys. Inform an HRA.
Presence, location and abundance of protected and important plant species and communities. Focus will likely vary between landfall options: • Freshwater West, and Freshwater East: sand dunes. • Bullslaughter Bay,New Quay Beach, and Greenala Point: maritime, calcareous and neutral grasslands; maritime heath. • Broad Haven South: sand dunes; maritime, calcareous and neutral grasslands; maritime heath. • All: field margins, verges, hedgerows.	National Vegetation Classification (NVC) botanical survey. Focussed survey for potential locations of protected / notable plant species.	Provide knowledge of exact types of plant communities that could be affected, the quality of the assemblages, and location of protected plant species. Inform design to minimise potential impacts. Inform appraisal of whether effects are significant, and to plan mitigation and/or restoration. Inform an HRA.

Data Requirement	Method	Purpose / Rationale
Presence, location and abundance of protected and important animal species.	Dependent on findings of the walkover survey, PEA recommendations and design work, but required surveys are expected to include: • Bat transect and static monitoring • Preliminary bat roost assessment • Bat roost survey • Badger • Riparian mammals • Dormice • Reptiles. Amphibian surveys are not proposed as great crested newts are considered to be absent from Pembrokeshire (Hayson et al. 2018) and it is reasonable to assume that other species of amphibians will be present within suitable habitat.	Provide knowledge of exact locations of protected species and their use of the landscape. Inform design to minimise potential impacts. Inform appraisal of whether effects are significant, and to plan mitigation. Inform an HRA. Support applications for protected species mitigation licences, if needed.

An EcIA will be carried out of the final design with reference to the Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater and Coastal (CIEEM, 2018). A Project Envelope approach will be used if not all design details have been confirmed at the time of the EcIA. The EcIA will confirm the mitigation measures incorporated into the design, additional mitigation needed during the construction, operation and decommissioning phases, and any monitoring requirements. The EcIA will also set out the information needed by the relevant competent authority to carry out an HRA.

6.6 Ornithology

This section outlines potential impacts to offshore and onshore ornithological interests within and around the Project Area, and identifies which potential impacts will require assessment during the EIA. The following section has been conducted as a desktop study, as no site-specific surveys have been conducted to date.

Offshore ornithological interests comprise:

- Seabirds and sea ducks present within the defined Study Area; and
- Migratory bird species passing through the PDZ.

Onshore ornithological interests comprise:

- Estuarine / coastal birds around the six landfall options (Freshwater West, Bullslaughter Bay, Broadhaven South, New Quay Beach, Greenala Point, and Freshwater East); and
- Bird species associated with potential onshore cable routes.

Protected site citations have been used to identify ornithology features and to help describe the baseline environment. The appraisal of potential effects on protected sites, to identify which sites and features need to be considered further, is included in Section 6.1.

6.6.1 Data and Information Sources

Key data that have been used to inform the baseline have been retrieved from the following sources:

- The Breeding Bird Survey 2019 (Harris et al. 2020)
- Desk-based revision of seabird foraging ranges used for HRA screening (Woodward et al. 2019)
- Seabirds at Sea – NRW shapefiles from ESAS data (http://lle.gov.wales/catalogue/item/SeabirdsAtSea/?lang=en)
- WWT monitoring data (e.g. Goose & Swan Monitoring Programme) (https://monitoring.wwt.org.uk/)
- Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping (Cleasby et al. 2020)
- JNCC Seabird Monitoring Programme Database (https://app.bto.org/seabirds/public/index.jsp)
- BTO Wetland Bird Survey (WeBS) database (https://app.bto.org/webs-reporting/numbers.jsp)
- Interactive Map (MAGIC, 2022);
- National Biodiversity Network Atlas (NBN, 2022);

The BTO Breeding Bird Survey report has been published for the 2021 season updating trends for all monitored species in Britain, plus separately for England, Wales, Scotland and Northern Ireland (Harris et al. 2022). Further seabird tracking data to inform seabird foraging range information has become available which effectively supersedes the summarised data within Thaxter et al. (2012). These include the FAME (Future of the Atlantic Marine Environment) and Royal Society for the Protection of Birds' (RSPB) STAR (Seabird Tracking and Research) projects. Data from these projects, tracking data reviewed by Thaxter et al. (2012) and tracking data from other projects since 2012 are all captured in summarising data of Woodward et al. (2019). The European Seabirds at Sea (ESAS) database and Wildfowl and Wetlands Trust (WWT) data sources had not been used and were therefore recommended. GIS shapefiles from the ESAS database are available specifically for Welsh waters via Lle – A Geoportal for Wales. Further resources on seabird populations and distribution are the RSPB mapping of important at-sea areas for

seabirds (Cleasby et al. 2020) and the JNCC Seabird Monitoring Programme Database accessible via the BTO. The BTO Wetland Bird Survey (WeBS) database is an additional source for up-to-date population estimates of waterbirds for UK estuaries including for sites designated as SPA or SSSI. The mean peak count over the most recent five years of WeBS data collection is commonly recommended by SNCBs for providing population estimates of SPA waterbirds for use in assessments including EIA and HRA.

6.6.2 Study Area

The Study Area comprises a 100 km buffer around the Project Area. This is to take account of bird species that forage and migrate considerable distances and may therefore be present within the Project Area. A wider Study Area was used for species with larger foraging ranges including gannet (*Morus bassanus*) and Manx shearwater (*Puffinus puffinus*), species which may forage respectively 229.4 km and over 300 km from breeding colonies (Thaxter et al, 2012).

6.6.3 Existing Environment

6.6.3.1 Offshore

The Pembrokeshire islands (Skomer, Skokholm and Grassholm) hold large numbers of Manx shearwaters, European storm-petrels, guillemots and razorbills. The island of Grassholm has a gannet population of 39,000 making it the third largest colony on the planet (comprising 1 in 10 of the world's gannets) (Welsh Ornithological Society, 2022).

Immediately north of the Project Area lie the Skomer, Skokholm and the seas off Pembrokeshire SPA and the Skomer and Skokholm SSSI (see Figures A6.1.3 and A6.1.4, Appendix A). The seaward boundary of the existing Skomer and Skokholm SPA was extended in 2017 to encompass two additional marine areas southwest of Pembrokeshire, which were identified as foraging hotspots for Manx shearwater and Atlantic puffin (JNCC, 2022) to form the Skomer, Skokholm and the seas off Pembrokeshire SPA.

This area is of particular interest for its breeding seabird colonies which include Manx shearwater, puffin, storm petrel, razorbill, guillemot, and lesser black-backed gull. Kittiwakes are listed as a nationally important interest feature on Skomer. Skokholm also has a designated seabird assemblage which includes lesser black backed gull, fulmar, herring gull and greater black-backed gull (NRW, 2009). Skomer and Skokholm are not noted to be of importance to overwintering seabirds.

The offshore area is also likely to be used as transiting by birds on passage to or from breeding and overwintering grounds.

6.6.3.2 Onshore

Four of the potential landfall locations, Freshwater West, Bullslaughter Bay, New Quay Beach, and Broadhaven South are within Castlemartin Coast SPA (see Figure A6.1.1, Appendix A). The SPA comprises of approximately 20 km of rocky coast with stacks and sea cliffs used by breeding birds and areas of coastal grassland which are important for foraging. The environment is ideal for breeding chough, nesting on the cliffs and foraging on the grasslands, this SPA supports 3.5% of the UK breeding population (JNCC, 2015a). The Milford Haven Waterway SSSI is also within the Project Area, which supports 1% of the British population of over-wintering shelduck, wigeon, teal, curlew, dunlin and little grebe (NRW, 2002).

6.6.3.3 Species and supporting habitats outside of protected sites

The proposed Pembroke Power Station grid connection is an industrial area, supporting a variety of industries including Pembroke Oil Refinery and Pembroke Power Station; a deep water cargo port; ferry terminal; fishing dock; marina; and, domestic properties. Currently, there is limited information available on the breeding and wintering bird species that are present in the area.

The NBN atlas has been used to identify species listed under 'Birds of Conservation Concern 5' (BTO, 2021) recorded within 5 km of each of the landfall option areas; a 5 km radius was used to provide coverage of species of conservation concern located in potential onshore cable routes. The results are listed in Table 6.14 and

Table 6.15.

Table 6.14 Birds of Conservation Concern 5 (BoCC5) Red List Bird Species Recorded within 5 km of Landfall Options (data from NBN Atlas),

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Arctic Skua *Stercorarius parasiticus*			✓	✓	✓	✓
Balearic Shearwater *Puffinus mauretanicus*			✓	✓	✓	
Black-tailed Godwit *Limosa limosa*	✓	✓	✓	✓	✓	✓
Common Redpoll *Acanthis flammea*			✓	✓	✓	✓
Common Scoter *Melanitta nigra*	✓	✓	✓	✓	✓	✓
Cuckoo *Cuculus canorus*	✓	✓	✓	✓	✓	✓
Curlew *Numenius arquata*	✓	✓	✓	✓	✓	✓

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Dotterel *Charadrius morinellus*	✓	✓				
Dunlin *Calidris alpina*	✓	✓	✓	✓	✓	
Fieldfare *Turdus pilaris*	✓	✓	✓	✓	✓	✓
Goldeneye *Bucephala clangula*	✓	✓	✓	✓	✓	✓
Grasshopper Warbler *Locustella naevia*	✓	✓	✓	✓	✓	✓
Greenfinch *Chloris chloris*	✓	✓	✓	✓	✓	✓
Grey Partridge *Perdix perdix*	✓	✓	✓	✓	✓	✓
Hen Harrier *Circus cyaneus*			✓	✓	✓	✓
Herring Gull *Larus argentatus*	✓	✓	✓	✓	✓	✓
House Martin *Delichon urbicum*	✓	✓	✓	✓	✓	✓
House Sparrow *Passer domesticus*	✓	✓	✓	✓	✓	✓
Kittiwake *Rissa tridactyla*	✓	✓	✓	✓	✓	✓
Lapwing *Vanellus vanellus*	✓	✓	✓	✓	✓	✓
Leach's Petrel *Hydrobates leucorhous*	✓	✓				
Lesser Spotted Woodpecker *Dryobates minor*			✓	✓		
Linnet *Linaria cannabina*	✓	✓	✓	✓	✓	✓
Long-tailed Duck *Clangula hyemalis*			✓	✓	✓	✓
Marsh Tit *Poecile palustris*	✓	✓	✓	✓	✓	✓
Merlin *Falco columbarius*	✓	✓	✓	✓	✓	✓
Mistle Thrush *Turdus viscivorus*	✓	✓	✓	✓	✓	✓
Pochard *Aythya ferina*	✓	✓	✓	✓	✓	
Puffin *Fratercula arctica*	✓	✓	✓	✓	✓	✓
Purple Sandpiper *Calidris maritima*	✓	✓	✓	✓	✓	✓
Red-necked Grebe *Podiceps grisegena*	✓	✓	✓	✓	✓	✓
Ring Ouzel *Turdus torquatus*	✓	✓	✓	✓	✓	

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Ringed Plover *Charadrius hiaticula*	✓	✓	✓	✓	✓	✓
Roseate Tern *Sterna dougallii*	✓	✓	✓	✓		
Ruff *Calidris pugnax*	✓	✓	✓	✓	✓	✓
Scaup *Aythya marila*	✓	✓	✓	✓	✓	✓
Shag *Gulosus aristotelis*	✓	✓	✓	✓	✓	✓
Skylark *Alauda arvensis*	✓	✓	✓	✓	✓	✓
Slavonian Grebe *Podiceps auritus*	✓	✓	✓	✓	✓	
Smew *Mergellus albellus*			✓	✓	✓	✓
Spotted Flycatcher *Muscicapa striata*	✓	✓	✓	✓	✓	✓
Starling *Sturnus vulgaris*	✓	✓	✓	✓	✓	✓
Swift *Apus apus*	✓	✓	✓	✓	✓	✓
Tree Pipit *Anthus trivialis*	✓	✓	✓	✓	✓	✓
Tree Sparrow *Passer montanus*			✓	✓	✓	✓
Tundra Swan *Cygnus columbianus*	✓	✓	✓	✓	✓	✓
Turtle Dove *Streptopelia turtur*			✓	✓	✓	✓
Velvet Scoter *Melanitta fusca*			✓	✓		
Whimbrel *Numenius phaeopus*	✓	✓	✓	✓	✓	
Whinchat *Saxicola rubetra*	✓	✓	✓	✓	✓	✓
White-fronted Goose *Anser albifrons*			✓	✓	✓	✓
Willow Tit *Poecile montanus*	✓	✓	✓	✓	✓	✓
Wood Warbler *Phylloscopus sibilatrix*			✓	✓	✓	✓
Woodcock *Scolopax rusticola*	✓	✓	✓	✓	✓	✓
Yellow Wagtail *Motacilla flava*	✓	✓	✓	✓	✓	✓
Yellowhammer *Emberiza citrinella*	✓	✓	✓	✓	✓	✓

Table 6.15 Birds of Conservation Concern 5 (BoCC5) Amber List Bird Species Recorded within 5 km of Landfall Options (data from NBN Atlas),

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Arctic Tern *Sterna paradisaea*		✓	✓	✓	✓	
Avocet *Recurvirostra avosetta*	✓					
Barnacle Goose *Branta leucopsis*	✓	✓	✓	✓	✓	✓
Bar-tailed Godwit *Limosa lapponica*	✓				✓	✓
Bittern *Botaurus stellaris*	✓	✓	✓	✓	✓	
Black Guillemot *Cepphus grylle*		✓	✓	✓	✓	
Black Redstart *Phoenicurus ochruros*	✓	✓	✓	✓	✓	✓
Black-headed Gull *Chroicocephalus ridibundus*	✓	✓	✓	✓	✓	✓
Black-necked Grebe *Podiceps nigricollis*	✓	✓	✓	✓	✓	
Black-throated Diver *Gavia arctica*	✓	✓	✓	✓	✓	✓
Brent Goose *Branta bernicla*	✓					
Bullfinch *Pyrrhula pyrrhula*	✓	✓	✓	✓	✓	✓
Cattle Egret *Bubulcus ibis*	✓	✓	✓	✓	✓	✓

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Common Guillemot *Uria aalge*	✓	✓	✓	✓	✓	✓
Common Gull *Larus canus*	✓	✓	✓	✓	✓	✓
Common Sandpiper *Actitis hypoleucos*	✓	✓	✓	✓	✓	✓
Common Tern *Sterna hirundo*		✓	✓	✓	✓	✓
Curlew Sandpiper *Calidris ferruginea*	✓				✓	✓
Dartford Warbler *Curruca undata*		✓	✓	✓	✓	✓
Dipper *Cinclus cinclus*					✓	✓
Dunnock *Prunella modularis*	✓	✓	✓	✓	✓	✓
Eider *Somateria mollissima*	✓		✓	✓	✓	
Fulmar *Fulmarus glacialis*	✓	✓	✓	✓	✓	✓
Gadwall *Mareca strepera*	✓	✓	✓	✓	✓	✓
Gannet *Morus bassanus*	✓	✓	✓	✓	✓	✓
Garganey *Spatula querquedula*	✓	✓	✓	✓		
Glaucous Gull *Larus hyperboreus*	✓	✓	✓	✓	✓	✓
Great Black-backed Gull *Larus marinus*	✓	✓	✓	✓	✓	✓
Great Northern Diver *Gavia immer*	✓	✓	✓	✓	✓	✓
Great Skua *Stercorarius skua*		✓	✓	✓	✓	
Great White Egret *Ardea alba*		✓	✓	✓	✓	✓
Green Sandpiper *Tringa ochropus*	✓	✓	✓	✓	✓	✓
Greenshank *Tringa nebularia*	✓	✓	✓	✓	✓	✓
Grey Plover *Pluvialis squatarola*	✓	✓	✓	✓	✓	
Grey Wagtail *Motacilla cinerea*	✓	✓	✓	✓	✓	✓
Greylag Goose *Anser anser*	✓	✓	✓	✓	✓	✓

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Iceland Gull *Larus glaucoides*	✓	✓	✓	✓	✓	✓
Kestrel *Falco tinnunculus*	✓	✓	✓	✓	✓	✓
Knot *Calidris canutus*	✓				✓	✓
Lapland Bunting *Calcarius lapponicus*	✓	✓				
Lesser Black-backed Gull *Larus fuscus*	✓	✓	✓	✓	✓	✓
Little Bittern *Ixobrychus minutus*		✓	✓	✓		
Little Tern *Sternula albifrons*		✓	✓	✓		
Manx Shearwater *Puffinus puffinus*	✓	✓	✓	✓	✓	✓
Marsh Harrier *Circus aeruginosus*	✓	✓	✓	✓	✓	
Meadow Pipit *Anthus pratensis*	✓	✓	✓	✓	✓	✓
Mediterranean Gull *Ichthyaetus melanocephalus*	✓	✓	✓	✓	✓	✓
Moorhen *Gallinula chloropus*	✓	✓	✓	✓	✓	✓
Oystercatcher *Haematopus ostralegus*	✓	✓	✓	✓	✓	✓
Pied Flycatcher *Ficedula hypoleuca*	✓	✓	✓	✓	✓	✓
Pintail *Anas acuta*	✓	✓	✓	✓	✓	✓
Quail *Coturnix coturnix*		✓	✓	✓	✓	✓
Razorbill *Alca torda*	✓	✓	✓	✓	✓	✓
Red-breasted Merganser *Mergus serrator*	✓	✓	✓	✓	✓	✓
Redshank *Tringa totanus*	✓	✓	✓	✓	✓	✓
Redstart *Phoenicurus phoenicurus*	✓					
Redwing *Turdus iliacus*	✓	✓	✓	✓	✓	✓
Reed Bunting *Emberiza schoeniclus*	✓	✓	✓	✓	✓	✓
Rook *Corvus frugilegus*	✓	✓	✓	✓	✓	✓
Sanderling *Calidris alba*	✓	✓	✓	✓	✓	✓

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Sandwich Tern *Thalasseus sandvicensis*	✓	✓	✓	✓	✓	✓
Sedge Warbler *Acrocephalus schoenobaenus*	✓	✓	✓	✓	✓	✓
Shelduck *Tadorna tadorna*	✓	✓	✓	✓	✓	✓
Shore Lark *Eremophila alpestris*		✓	✓	✓		
Short-eared Owl *Asio flammeus*	✓	✓	✓	✓	✓	✓
Shoveler *Spatula clypeata*	✓	✓	✓	✓	✓	✓
Snipe *Gallinago gallinago*	✓	✓	✓	✓	✓	✓
Snow Bunting *Plectrophenax nivalis*	✓	✓				
Song Thrush *Turdus philomelos*	✓	✓	✓	✓	✓	✓
Sparrowhawk *Accipiter nisus*	✓	✓	✓	✓	✓	✓
Spoonbill *Platalea leucorodia*	✓					
Spotted Redshank *Tringa erythropus*	✓	✓	✓	✓	✓	✓
Stock Dove *Columba oenas*	✓	✓	✓	✓	✓	✓
Storm Petrel *Hydrobates pelagicus*	✓	✓	✓	✓	✓	
Tawny Owl *Strix aluco*	✓	✓	✓	✓	✓	✓
Teal *Anas crecca*	✓	✓	✓	✓	✓	✓
Turnstone *Arenaria interpres*	✓	✓	✓	✓	✓	✓
Water Pipit *Anthus spinoletta*	✓					
Wheatear *Oenanthe oenanthe*	✓	✓	✓	✓	✓	✓
Whitethroat *Curruca communis*	✓	✓	✓	✓	✓	✓
Whooper Swan *Cygnus cygnus*	✓	✓	✓	✓	✓	✓
Wigeon *Mareca penelope*	✓	✓	✓	✓	✓	
Willow Warbler *Phylloscopus trochilus*	✓	✓	✓	✓	✓	✓
Woodpigeon *Columba palumbus*	✓	✓	✓	✓	✓	✓

Species	Landfall Option					
	Freshwater West	Bullslaughter Bay	New Quay Beach	Broadhaven South	Greenala Point	Freshwater East
Wren *Troglodytes troglodytes*	✓	✓	✓	✓	✓	✓
Yellow-browed Warbler *Phylloscopus inornatus*	✓	✓	✓	✓		
Yellow-legged Gull *Larus michahellis*	✓					

6.6.4 Potential Impacts

The potential impacts of the proposed Project are set out in Table 6.16 for offshore ornithology and Table 6.17 for onshore ornithology.

Table 6.16 Summary of Key Sensitivities and Potential Impacts for Offshore Ornithology

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	Yes	Installation of offshore infrastructure within the PDZ and offshore cable route during the construction phase (and activities such as vessel movements) carries a risk of potential localised damage or modification of seabed habitats used by birds, change to water clarity affecting birds foraging underwater, and disturbance to birds through underwater noise/vibration, and above-water noise or visual disturbance.
Foraging birds	Indirect impacts due to habitat loss for prey, mortality displacement or aggregation of prey	Yes	Installation of infrastructure during the construction phase carries a moderate to high risk of potential damage or modification of seabed or substrata habitat used by marine prey of birds, and mortality, displacement or clustering of prey, altering their availability to foraging birds.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
All seabird and diving species	Direct impact of displacement of birds due to human activity and noise.	Yes	Human activity and noise associated with the construction phase, including from vessel movements and horizontal direct drilling, carries a moderate to high risk of direct disturbance and displacement of seabirds and diving birds (divers, sea ducks etc.) from an area of sea otherwise suitable for foraging, resting, passage etc.
Operational Phase			
Birds migrating and / or foraging at sea	Direct impact due to collision risk	Yes	The introduction of long-term submerged and above-water infrastructure such as the MOS platform has potential collision risk, respectively, to pursuit-diving birds such as auks, and migrating birds (particularly at night). These collision risks are likely to be low. However, there is limited understanding regarding both groups of the effect of introduction of light on collision risk (e.g. potential of Aid-to-Navigation (AtN) lights on the structure to attract or alert migratory birds). Risk will be dependent on location and spacing of substations.
Birds migrating and / or foraging at sea	Indirect impact due to barrier effect	Yes	The relatively small footprint and height of the MOS platform is likely to result in a low risk of barrier effects. Migrating and foraging birds are potentially more likely to undertake avoidance of individual structures compared to avoidance of the whole array area, as may occur when turbines are present; therefore, magnitude of barrier effects and indirect effects on foraging, energetics and mortality would be reduced. Risk will be dependent on location and spacing of substations.
Birds foraging at sea	Indirect impact due to loss of food source	Yes	The substations on the seabed will lead to loss of benthic habitat. The loss of habitat has potential to impact on prey resource of foraging birds. Impact significance will depend on relative importance of the habitat in context of the wider area for supporting bird prey sources.
Roosting and foraging birds	Direct impact of noise/disturbance	No	No material operational noise from the MOS platform, limited vessel traffic as MOS platform unmanned
All seabirds and coastal species	Direct impact of temporary loss of foraging habitat	No	Limited human presence and vessel traffic as MOS platform unmanned.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
All bird species	Indirect impact of displacement of prey species	No	Limited human presence and vessel traffic as MOS platform unmanned.
Decommissioning Phase			
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	Yes	Decommissioning activities are predicted to involve similar activities to during construction such as vessel movements and disturbance to seabed, and therefore carry similar potential direct and indirect impacts on birds to during construction.
Foraging birds	Indirect impacts due to habitat loss for prey, mortality displacement or aggregation of prey	Yes	
All seabird and diving species	Direct impact of displacement of birds due to human activity and noise	Yes	

Table 6.17 Summary of Key Sensitivities and Potential Impacts for Onshore Ornithology

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	Yes	Installation of nearshore and onshore infrastructure within the cable route and landfall during the construction phase (and activities such as vessel movements) carries a moderate to high risk of potential damage or modification of coastal habitats used by birds and disturbance to birds through underwater noise/vibration, above-water noise or visual disturbance.
Foraging birds	Indirect impacts due to habitat loss for prey or displacement of prey	Yes	Installation of infrastructure during the construction phase carries a moderate to high risk of potential damage or modification of coastal habitat used by prey of birds, through penetration of seabed and substrata, changes in suspended solids and (light) smothering or siltation rate changes; and displacement of prey; altering availability of prey to foraging birds.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Breeding, roosting and foraging birds	Direct impact of displacement of birds due to disturbance from human activity and noise.	Yes	Human activity and noise associated with the construction phase, including from vessel movements and presence of plant and workers on shore, carries a moderate to high risk of direct disturbance and displacement of coastal birds (waterfowl, waders etc.).
Operational Phase			
Foraging and breeding birds	Indirect impact due to loss of food source	Yes	The footprint of nearshore and onshore infrastructure will lead to loss of foraging habitat and potentially additional reduction in food supply of birds in the vicinity. Impact significance will depend on relative importance of the habitat in context of the wider area for supporting bird food sources (e.g. invertebrate, vertebrate, seed).
Breeding, roosting and foraging birds	Direct impact of noise/disturbance	No	No material operational noise from onshore plant. Limited vessel movements in nearshore cable route during O & M.
Decommissioning Phase			
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	Yes	Decommissioning activities are predicted to involve similar activities to during construction such as vessel movements in nearshore habitat and presence of humans and plant in onshore habitat, and therefore carry similar potential direct and indirect impacts on birds to during construction.
Foraging birds	Indirect impacts due to habitat loss for prey or displacement of prey	Yes	
Breeding, roosting and foraging birds	Direct impact of displacement of birds due to disturbance from human activity and noise	Yes	
Cumulative Impacts are scoped in for this receptor group			

6.6.5 Potential Mitigation

The need for mitigation (and the feasibility of this) will be dependent on the results of site specific surveys and the EIA. Consultation with key ornithological stakeholders will include discussion of the need for mitigation and the feasibility of potential options.

Restriction of activities during sensitive periods for birds may be considered as an option.

Examples of sensitive periods for birds during which activities could be restricted are:

- The peak abundance period (typically January-February) for wintering sea ducks (e.g., common scoter) and divers (e.g. red-throated diver) which are sensitive to displacement by cable and construction activities.
- Breeding season of coastal nesting birds sensitive to direct coastal disturbance such as terns (typically May to August).
- Periods of peak energetic demand for onshore wintering waterfowl and waders (e.g., periods of forecast sub-zero-Celsius temperatures for seven days or more)

6.6.6 Environmental Assessment Approach

It has been agreed through consultation with NRW that the baseline characterisation for birds at sea will be desk-based, relying on existing datasets, and in addition the Revised Welsh Marine Mammal Atlas, due to be published in 2023.

Coastal surveys are proposed to be scheduled for two years to detect interannual variation, with a minimum of:

- two diurnal visits per month (one at high and one at low water)
- one crepuscular and one nocturnal visit per month during (at minimum) high tide in non-breeding months (late summer to following April);
- to account for within year, intertidal and day-night variation in habitat-use by disturbance-sensitive waterbirds. Survey scheduling must account for some non-breeding waterbird features of SPAs being present in largest numbers in passage migration periods; noting that ‘autumn’ migration takes place relatively early in some species (e.g., in July/August).

Winter bird terrestrial surveys are proposed to be scheduled monthly September to March, over two years to detect interannual variation.

Breeding bird terrestrial surveys are proposed be scheduled over two years to detect interannual variation.

The terrestrial survey area will include at least a 100m buffer area around the proposed work area to include adjacent areas potentially disturbed by works.

Consultation with SNCBs will determine terrestrial survey design and identify existing data sources on sensitive populations, e.g. chough, which could supplement project specific surveys.

7 The Human Environment

7.1 Commercial Fisheries

This section describes the commercial fisheries baseline environment and potential effects associated with the construction, operation and decommissioning of the Project.

Any assessment of the impact of the proposed scheme upon commercial fisheries should adhere to the following guidance:

- Fishing and Submarine Cables - Working Together (International Cable Protection Committee, 2009); and
- Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014)

As discussed in Section 3.2.1, the Welsh National Marine Plan is published, and includes the following policy of relevance to Commercial Fisheries:
Policy ECON_02, Coexistence –

"Proposals should demonstrate how they have considered opportunities for coexistence with other compatible sectors in order to optimise the value and use of the marine area and marine natural resources."

7.1.1 Data and Information Sources

This chapter is informed by data for fishing vessel effort (MMO data), value of landings (MMO data) and inshore fishing activity (Cefas data) sourced from:

- Wales Marine Planning Portal
- MMO

7.1.2 Study Area

The Study Area focuses on commercial fishing activity within, and in proximity to, the Project Area (Figure 2.1); this has been considered within the wider context of fishing activity in the Irish Sea as a whole.

7.1.3 Existing Environment

7.1.3.1 Value of landings and effort

Value by ICES rectangle

The PDZ lies within, and covers a small portion of, ICES rectangles 31E4 and 31E5. The majority of the PDZ lies within rectangle 31E4, covering 1.9% of the rectangle. A small portion of PDZ area lies within rectangle 31E', covering 0.4% of the rectangle. In the period 2016-2020 (latest available data from the MMO), an average of £346k and £2.28m worth of fish was landed annually from ICES rectangles 31E4 and 31E5, respectively. Most of this (31E4: £235k; 31E': £1.61m) was from static gear (pots and traps, drift and fixed nets) and the remainder was from mobile gear (beam trawl, demersal trawl/seine).

Further inshore, possible export cable routes pass through 32E4 and 32E5. The average annual value of landings in 2016-2020 from 32E4 is higher than 31E4 (within which the majority of the offshore PDZ area is situated) at £2.47m (having declined in recent years from £3.18m in 2017 to £1.57m in 2020) and dominated by landings from pots and traps. Total landings from 32E5 are lower, with average annual value of landings in 2016-2020 at £1.52m, again dominated by static gear landings (pots and traps, drift and fixed nets)

MMO spatial data layers

Higher resolution value of landings and effort layers, compared to those described above, are available from the MMO. Average data across five years (2011 to 2015 incl.) are provided in Appendix A, Figures A7.1.1; A7.1.2; A7.1.3; A7.1.4 (latest available mapped data is for 2015). This is provided at a resolution of approximately 7.5 m² and is available for vessels over 15 m in length only. The combined value of landings for the 7.5 m² cells covering (wholly or partly) the PDZ is given in Table 7.1. This indicates that the area within and surrounding the PDZ, excluding the possible export cable routes, is of relatively low value to commercial fisheries (relative to other fishing grounds nearby). However, the area is likely to be of particular commercial importance to some individual commercial fishing vessels.

Table 7.1 Value of Landings for the 7.5 m² cells, wholly or partly, covering the PDZ

Value of landings (£/year) Ave. 2011-2015, >15 m vessels only			
Gear type	Mobile	Static	Total Value
£/year	22,843	4,700	27,543

Inshore fishing activity (static gear, generally pots and traps, drift and fixed nets) dominates the areas along the possible export cable routes. The Appendix A, Figures A7.1.5 to A7.1.6 which show inshore fishing activity (from Cefas, 2010-12), indicate that there is likely to be less inshore fishing activity along routes into Bullslaughter Bay than Freshwater West; however, this data could be out of date and should

be confirmed with local fishermen and Welsh Government Marine Enforcement Officers once more detailed routes are available.

7.1.4 Potential Impacts

The potential impacts of the proposed Project on commercial fisheries are set out in Table 7.2.

Table 7.2 Summary of Key Sensitivities and Potential Impacts for Commercial Fisheries

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Commercial fishing vessels	Reduction in access to, or exclusion from established fishing grounds (inshore and offshore)	Yes	Temporary and localised displacement of vessels will occur during construction works e.g. cable laying
Commercial fishing vessels	Collision risk between fishing vessels and PDZ infrastructure. Risk of damage to fishing vessels and gear entanglement.	Yes	Irrespective of the location of target fishing grounds, commercial fishing vessels will transit the area, whether gear is deployed or not. Collisions may occur between fishing and work vessels, sub surface cables during laying, MOS platform structure etc.
Commercial fishing vessels	Effects on spawning areas, or migration patterns (including the risk of electro-magnetic interference)	Yes	This impact is scoped in on a precautionary basis and will be informed by the Fish and Shellfish Ecology EIA.
Commercial fishing vessels	Displacement of regular vessel routes due to statutory exclusion or establishment of safety zones around PDZ or around export cables.	Yes	Whilst given the reduced scale of the updated Project design, this effect is anticipated to be non-significant, this impact is scoped in on a precautionary basis.
Intertidal commercial and hobby fishermen	Export cable routes (and associated infrastructure) as well as potential cable landfall locations could overlap with, and temporarily infringe on gathering of shellfish.	Yes	Whilst this impact is scoped in at this stage, further refinement of landfall options and cable routing may result in a scenario of no overlap between PDZ infrastructure and shellfish gathering, in which case, this impact will be scoped out of the subsequent EIA (with justification provided).
Operational Phase			

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Operational phase impacts are anticipated to be similar in nature to construction, however the length of impacts will be considered to be long-term rather than temporary.			
Decommissioning Phase			
All impacts scoped into the construction phase are scoped into the decommissioning phase. However, baseline conditions may have changed. This will need to be understood to inform the final decommissioning approach.			
Cumulative Impacts are scoped in for this receptor group			

7.1.5 Potential Mitigation

Potential mitigation of impacts on commercial fisheries takes the form of an appropriately designed engagement process during further environmental assessment stages; as well as the design and inclusion of specific measures for the Project (e.g. marker buoys to clearly delineate the area surrounding the devices). It is important to ensure good communication with the commercial fisheries sector to determine potential impacts and explore options for mitigation. This could be achieved through the appointment of a fisheries liaison officer who could:

- Act as a single point of contact for the commercial fisheries sector, with flexible working hours to match fishermen's working patterns, using an array of communication methods;
- Collate, understand and relay fishing industry views;
- Relay timely and accurate information from CSP to the commercial fisheries sector and fishing communities about the Project,
- Offer advice on appropriate mitigation measures and processes;
- Develop and ensure a positive relationship between CSP and the commercial fisheries sector and fishing communities.

7.1.6 Environmental Assessment Approach

During the next stages of the environmental assessment, further data should be collected as set out in Table 7.3. This data gathering should involve an appropriately designed engagement process, fitting to the commercial fisheries sector and fishing communities, potentially affected by this Project. Ideally, the work should be led and managed by a fisheries liaison officer.

Table 7.3 Proposed Additional Data Collection for Commercial Fisheries

Data requirement	Method	Purpose/Rationale
Determine an appropriate engagement strategy with the commercial fisheries sector and fishing communities.	Consult and agree with fishing representatives in Wales, Devon and Cornwall as to the appropriate means of engagement (e.g. style of engagement, when, where, with whom, by what medium and for what purpose).	To act as a single point of contact for the commercial fisheries sector and fishing communities in a flexible manner, with flexible times to match fishermen working patterns, using an array of communication methods: • To accurately collate, understand and relay fishing industry views; and • To relay timely and accurate information from the developer(s) to the commercial fisheries sector and fishing communities about the Project, in an efficient and effective manner.
Information regarding value of landings, fishing effort, fishing vessels, fishing grounds, gear type and target species; for the Cornwall and Devon fishing fleet operating in the area of the PDZ (particularly for the under 15m vessels).	Consultation with Cornwall Fish Producers Organisation (FPO), South West FPO, Cornwall Inshore Fisheries & Conservation Authority (IFCA). Consultations may identify others groups and associations to consult.	To determine any risk of possible interactions of the MOS, the export cable routes and possible landfall locations with fishing vessels.
Further, more detailed understanding of potential risk of possible interactions with fishing vessels transiting or fishing in the area; especially for the inshore fleet for which publicly available data is lacking.	Further consultation with WWSFA ltd, WFA and SWWFC. Local Welsh Government Fishery Office in Milford Haven.	Further detail the risk of possible interactions of the MOS, the export cable routes and possible landfall locations with fishing vessels.
Information regarding value of landings, fishing effort, fishing vessels, fishing grounds, gear type and target species; with non-UK fishing vessels operating in the area of the PDZ.	Confirmation with MMO as to non-UK vessels working in the area and subsequent consultation with these fleets if needed.	Further detail the risk of possible interactions of the MOS, the export cable routes and possible landfall locations with fishing vessels.
Information regarding value of landings, fishing effort, fishing vessels, fishing grounds, gear type and target species; with fishing vessels operating in the area of the PDZ.	Consultation with local MMO and IFCA officers working in South Wales, Devon and Cornwall to verify publicly available data sets.	Further detail the risk of possible interactions of the MOS, the export cable routes and possible landfall locations with fishing vessels.

7.2 Shipping and Navigation

This section describes the shipping and navigation baseline environment and potential effects associated with the construction, operation and decommissioning of the Project. A detailed baseline assessment would be proposed as part of the Navigation Risk Assessment (NRA) and ES.

7.2.1 Data and Information Sources

The navigational features baseline has been established following a review of:

- Admiralty Charts of various dates (UKHO, 2022);
- Sailing Directions covering the Study Area (Admiralty, 2022); and
- MMO datasets on shipping routes and port locations (accessed December, 2022).

7.2.2 Study Area

The Study Area encompasses shipping and navigation activities within, and in proximity to, the Project Area (Figure 2.1).

7.2.3 Existing Environment

An overview of the navigational features discussed in this section are presented in Appendix A, Figure A7.2.1.

The key navigational features in the vicinity of the Project Area are shipping channels. The principal navigation channel for vessels transiting north to south is located to the west, and that for vessels transiting east to west is located to the north of the PDZ area. The principal navigation channel for vessels transiting east to west (located to north of the PDZ) contains the convergence of the shipping lanes from the inner Bristol Channel, originating from Cardiff, Newport, Bristol, Port Talbot, and Swansea heading for Milford Haven or continuing westward. The navigation channels are used by large cargo vessels, tankers, ferries but also smaller craft such as fishing vessels and recreational boats. The cable route is not yet known; however given the location of the preferred landfall options under consideration, the route will most likely pass through the east to west navigational channel, but not the north to south channel located to the west.

The Freshwater West landfall option includes an offshore cable route which is in the vicinity of the vessel approach to Milford Haven. Milford Haven is the fifth largest port in the UK. The Milford Haven Port Authority provides port, harbour and associated services, as well as the navigational needs of the three major oil refineries in the Haven. Annually, the Milford Haven port handles 1,688 dues paying ships (Milford Haven Port Authority, 2022). A twice daily ferry service runs from Pembroke Dock Ferry Terminal

to Rosslare, Southern Ireland. Milford Haven Port Authority is also currently working with partner ports in Northern Spain to initiate a freight ferry service from Spain to the UK. There are informal anchorages present in proximity to the PDZ, principally for vessels waiting to dock at Milford Haven.

There are a number of harbours, quays and marinas used by recreational vessel traffic in the vicinity of the Project Area, including Royal Yachting Association (RYA) training centres. These recreational vessels may also use the east-west navigational channel passing to the north of the PDZ, and a small number may be present within the wider Project Area (average annual vessel densities of between 4 and 500) (MMO, 2019)). The harbours, quays and marinas in the vicinity of the PDZs, cable routes and landfalls include: Milford Haven Marina, Neyland Yacht Haven, Porthgain Harbour, Fishguard Harbour, Saundersfoot Harbour, Cresswell Quay, Solva Quay, Stackpole Quay and Tenby.

Motor cruising and dive boats are known to depart from Freshwater East. Recreational sailing is also a popular activity with sailing clubs located along the coast. However, due to Ministry of Defence (MoD) restrictions, there are no formal anchorages along this part of the south coast although Freshwater Bay and Barafundle Bay traditionally provide sheltered anchorages for vessels passing through these waters, see Section 7.3 (Coastal and Marine Infrastructure and Other Users), for more detail.

7.2.4 Potential Impacts

This section below summarises the potential impacts of the proposed Project on navigational receptors identified as part of the baseline assessment. However, it should be noted that a full baseline assessment as part of the NRA may identify additional impacts from receptors that could not have been identified using the data considered within this Scoping Report.

As described in Section 2 (Project Description), the preferred landfall options are currently Freshwater West, Bullslaughter Bay, New Quay Beach, Broadhaven South, Greenala Point and Freshwater East. None of these cable routes will pass through the busy Milford Haven waterway.

The potential impacts of the proposed Project on shipping and navigational receptors are set out in Table 7.4.

Table 7.4 Summary of Key Sensitivities and Potential Impacts for Shipping and Navigation

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Recreational and commercial vessels	Interaction of Project vessels with commercial, fishing and recreational vessels	Yes	During the construction phase the presence of installation vessels undertaking construction activities within will have the potential to interfere with marine users.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Recreational and commercial vessels	Impacts on vessel routes	Yes	MGN 654 requires that assessments should be made of the consequences of ships deviating from normal routes to avoid proposed sites, including smaller vessels e.g. domestic, coasters, recreational or fishing vessels, entering shipping routes with larger vessels. The NRA should identify whether the nearby area contains any prescribed routeing schemes, the alignment and proximity of the Project relative to any adjacent shipping routes and whether these areas contain shipping routes used by coastal, deep-draught or international scheduled vessels on passage.
Recreational and commercial vessels	Displacement of anchorages	Yes	It will be necessary to review the proximity of the site to areas used for anchorage (charted or uncharted), safe havens, port approaches and pilot boarding or landing areas. Applicability should be identified through baseline analysis.
Recreational and commercial vessels	Impact on Under Keel Clearance	Yes	The installation of export cables and armouring (if required) may reduce navigable water depth. The MCA accepts up to a 5% change in navigable water depth.
Recreational and commercial vessels	Increased collision risk with other marine users	Yes	The presence of construction vessels has the potential to increase collision risk in the area. Collision risk may increase if the Project obstructs or restricts established routeing, or if small vessels are pushed in to the path of larger vessel routes.
Recreational and commercial vessels	Increased vessel contact risk	Yes	The physical presence of the MOS may increase vessel to structure contacts.
Search and Rescue	Impacts on emergency response resources	Yes	MGN 654 (Annex 5) requires impacts to Search and Rescue to be considered and assessed and creation and implementation of an Emergency Response Cooperation Plan with the MCA's Search and Rescue Branch for the construction phase onwards.
Recreational and commercial vessels	Interaction with subsea cables	Yes	The significance of impact will be dependent on the locations of cable route. Cables and/or cable protection may pose a snagging risk to vessel anchors or fishing gear.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Operational Phase			
Recreational and commercial vessels	Interaction of Project vessels with commercial, fishing and recreational vessels	Yes	During the operation phase maintenance vessels will have the potential to interfere with marine users.
Recreational and commercial vessels	Impacts on vessel routes	Yes	MGN 654 requires that assessments should be made of the consequences of ships deviating from normal routes to avoid proposed sites, including smaller vessels e.g. domestic, coasters, recreational or fishing vessels, entering shipping routes with larger vessels. The NRA should identify whether the nearby area contains any prescribed routeing schemes, the alignment and proximity of the Project relative to any adjacent shipping routes and whether these areas contain shipping routes used by coastal, deep-draught or international scheduled vessels on passage.
Recreational and commercial vessels	Displacement of anchorages	Yes	It will be necessary to review the proximity of the site to areas used for anchorage (charted or uncharted), safe havens, port approaches and pilot boarding or landing areas. Applicability should be identified through baseline analysis.
Recreational and commercial vessels	Impact on Under Keel Clearance	Yes	The installation of export cables and armouring (if required) may reduce navigable water depth. The impact will depend upon the navigable depths of the cable routes. The MCA will accept up to a 5% change in navigable water depth.
Recreational and commercial vessels	Increased collision risk with other marine users	Yes	The presence of construction vessels has the potential to increase collision risk in the area. Collision risk may increase if the Project obstructs or restricts established routeing, or if small vessels are pushed in to the path of larger vessel routes.
Recreational and commercial vessels	Increased vessel contact risk	Yes	The physical presence of the MOS may increase vessel to structure contacts, including drifting contacts by small craft.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Search and Rescue	Impacts on emergency response resources	Yes	MGN 654 (Annex 5) requires impacts to Search and Rescue to be considered and assessed and the creation and implementation of an Emergency Response Cooperation Plan with the MCA's Search and Rescue Branch for the construction phase onwards.
Recreational and commercial vessels	Interaction with subsea cables	Yes	The significance of the impact will be dependent on the locations of the cable routes. Cables and/or cable protection may pose a snagging risk to vessel anchors or fishing gear.
Decommissioning Phase			
Recreational and commercial vessels	Interaction of Project vessels with commercial, fishing and recreational vessels	Yes	During the decommissioning phase, Project vessels will have the potential to interfere with marine users.
Recreational and commercial vessels	Impacts on vessel routes	No	Routeing would be established by this time. The removal of the MOS would increase available sea room.
Recreational and commercial vessels	Displacement of anchorages	No	Anchorages (charted or uncharted), safe havens, port approaches and pilot boarding or landing areas would already be established.
Recreational and commercial vessels	Impact on Under Keel Clearance	No	Assuming that all Project infrastructure would be removed as part of the decommissioning process.
Recreational and commercial vessels	Increased collision risk with other marine users	Yes	The presence of vessels involved in decommissioning could have the potential to increase collision risk in the area.
Recreational and commercial vessels	Increased vessel contact risk	No	Removal of Project infrastructure would reduce vessel to structure contacts.
Search and Rescue	Impacts on emergency response resources	No	An Emergency Response Cooperation Plan would have been established and implemented since the construction phase. Removal of topside increases SAR capabilities and reduces the likelihood of incidents resulting from contact/allision, for example.
Recreational and commercial vessels	Interaction with subsea cables	No	Assuming that all Project infrastructure would be removed as part of the decommissioning process. Any cables/ cable protection left in situ should be marked on nautical charts and mariners should be aware of their presence.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Cumulative Impacts are scoped in for this receptor group			

7.2.5 Potential Mitigation

The following mitigation is proposed for the Project:

- Compliance with MCA Marine Guidance Note 654;
- Mark Project on Admiralty Charts;
- Promulgation of information and warnings through notices to mariners and other appropriate media;
- Multi-channel VHF, including Digital Selective Calling, to be used during construction and operational activities where necessary;
- Safety zones of appropriate configuration, extent and application during construction and decommissioning;
- Appropriate means to notify and provide evidence of the infringement of safety zones;
- Marine Traffic Control for project vessels during construction;
- Creation of an Emergency Response Co-operation Plan;
- Inter-array and export cable protection (where necessary);
- Marking and lighting the site in accordance with General Lighthouse Authority requirements (which includes a system of routine inspection and maintenance of lights and marks);
- Vessel nomination as guard vessel during construction/decommissioning activities (where applicable);
- Compliance by all project vessels with COLREGS (IMO, 1972) and SOLAS (1974);
- Completion of hydrographic surveys in accordance with International Hydrographic Organisation (IHO) standards;
- Periodic cable monitoring to ensure burial/protection remains effective; and
- Cable burial risk assessment to identify where cable protection may exceed 5% of navigable depth.

7.2.6 Environmental Assessment Approach

Consultation will be undertaken with the MCA to establish level of AIS/RADAR collection requirement given that the MOS platform has a relatively small footprint and height.
To inform the baseline conditions for the EIA, an initial desktop study of existing AIS and vessel data collected previously for the Study Area will be undertaken, utilising existing data sets where available. Data gaps will be identified and addressed as appropriate.

Table 7.5 Proposed Additional Data Collection for Shipping and Navigation

Data	Notes
Marine Accident Investigation Branch (MAIB) maritime incident data.	Available from 1992-2020
Royal National Lifeboat Institute (RNLI) maritime incident data	RNLI callouts available from 2008 to 2020

Data	Notes
Admiralty Charts	Regularly updated.
Admiralty Sailing Directions (NP 37)	2022 version available
Royal Yachting Association UK Coastal Atlas of Recreational Boating (2009)	2019 version available.
Automatic Identification System (AIS) and radar data. Standard practice is for a minimum of 28 days of marine traffic survey data (to be collected within 24 months and should include AIS, radar and visual observations collected from vessel based surveys. The marine traffic survey data will also consider seasonal variations.	Consultation with the MCA required to establish the level of AIS/RADAR collection requirement given that 1 relatively small-scale MOS platform is to be constructed.

7.3 Coastal and Marine Infrastructure and Other Users

This section describes the coastal and marine infrastructure and other users baseline environment and potential effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

This section covers any existing or planned marine industry activities in proximity to the PDZ, possible export cable routes and landfall locations, which may be impacted by the Project. This covers military activity, disposal sites, oil and gas, ports and harbours, interconnector and telecom cables and any other activities such as aggregate extraction, or other renewable energy plans.

Several coastal and marine infrastructure sectors as listed above have guidance of relevance to consider for this project i.e. about managing possible interactions with other renewable energy infrastructure proposals and activities. These are:

- European Subsea Cables Association Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues (this mentions military, aggregate, ports/harbours, cabling, disposal of dredging spoil, oil and gas activities)
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999)
- International Cable Protection Committee (ICPC) recommendations, October 2017
- European Subsea Cables Association (ESCA) recommendations.

As discussed in Section 3.2.1, the Welsh National Marine Plan has since been published which includes the following policy of relevance to the Coastal and Marine Infrastructure and Other Users assessment for the PDZ:

- DEF_01: Defence (safeguarding) –

Proposals that: potentially affect Ministry of Defence (MOD) Danger Areas, Exercise Areas or strategic defence interests; and/or
potentially interfere with communication, surveillance and navigation facilities necessary for defence and national security;

should only be authorised with the agreement of MOD.

- SAF_01: Safeguarding existing activity

Proposals likely to have significant adverse impacts upon an established activity covered by a formal application or authorisation must demonstrate how they will address compatibility issues with that activity.
Proposals likely to have significant adverse impacts upon an established activity not subject to a formal authorisation must demonstrate how they will address compatibility issues with that activity.

- SAF_02: Safeguarding strategic resources

Proposals which may have significant adverse impacts upon the prospects of any sector covered by this plan to engage in sustainable future strategic resource use (of resources identified by an SRA) must demonstrate how they will address compatibility issues with that potential resource use.

7.3.1 Data and Information Sources

This chapter has been informed by the following datasets:

- MMO Interactive Map;
- Wales Marine Planning Portal; and
- Crown Estate GIS data
- KIS-ORCA GIS data
- Oil & Gas Authority GIS data

7.3.2 Study Area

The Study Area encompasses the marine and coastal activities within the Project Area (Figure 2.1).

7.3.3 Existing Environment

7.3.3.1 Military activity

The possible export cable routes are likely to pass through the MoD Castlemartin Danger Area, and a small part (19 km^2) of the PDZ also overlaps with the MoD Castlemartin Danger Area (referred to as Practice Areas in Appendix A, Figure A7.3.1). Consultation with MoD Castlemartin has confirmed that the majority of the PDZ itself lies outside of the firing template. As such, the MoD has confirmed that there is a minimal risk of interaction between the PDZ and military activity. Information from the MoD suggests that

for the majority of the year, only the smaller (nearest to shore) firing templates are used. However, for around two weeks of the year the larger templates are used with the potential of debris up to the boundary of the Danger Area.

The small footprint and height of the MOS is unlikely to significantly effect MoD operations including radars, communication and surveillance systems, seismological recording equipment, communications facilities, naval operations and low flying; which may affect MoD monitoring of shipping in and out of the Danger Areas.

7.3.3.2 Disposal sites

There are six disposal sites inshore of the PDZ, which are of relevance to consider for this Scoping Study (see Appendix A, Figure A7.3.1 The nearest is an open disposal site, approximately 6 km from the PDZ (Milford Haven Two, LU168) and is likely to be used by Milford Haven Port to dispose of dredged material from navigational channels. Another open disposal site (Neyland, LU190) is located near to Neyland within Milford Haven. A further three disposal sites are both closed: Milford Haven (LU170), within which St. Annes Head (LU180) is contained, are both located 21 km away from the PDZ in the mouth of the Milford Haven; whilst another, now closed ammunitions disposal site (which may contain unexploded ordinance), stretches inshore along the Pembrokeshire coast4. All could potentially present constraints as to the routing of the PDZ export cable. There is another, now closed, large disposal site (Milford Haven Industrial, LU040) approximately 10km to the south west of the PDZ. However, this is not expected to encroach on any of the PDZ activity and so is scoped out of this report.

7.3.3.3 Ports and harbours

There are three ports and harbours in Pembrokeshire in proximity to the PDZ and potential export cable routes. These are Milford Haven, Pembroke and Stackpole Quay (see Appendix A, Figure A7.3.1). Section 7.2 (Shipping and Navigation) provides more detail in terms of port and vessel activities in proximity to the PDZ and possible export cable routes.

The Port of Milford Haven is the UK's fifth largest port. It is the country’s largest handler of oil and gas, and is capable of delivering 30% of the UK gas demand. Activities also include cargo handling, ferry operations to Ireland, fisheries landings, cruise and marina operations. It undertakes dredging activities in the Milford Haven in order to ensure the safe navigation of vessels throughout the Milford Haven. A pilot boarding area is located approximately 8km offshore from the mouth of the Milford Haven.

Pembroke Port is part of the Port of Milford Haven’s operations. It is a secure deep water cargo port specialising in the transportation of loose, baled, palletised and heavy lift cargoes; including aggregates, refinery components and renewable energy devices. Pembroke Dock has secured funding to develop a world-class centre for marine energy research and development, fabrication, and testing in Pembrokeshire. Marine Energy Wales, ORE Catapult and WHL are partners in this £76m Swansea Bay City Deal Project.

Stackpole Quay is owned by the National Trust and is used by fishing craft and also as a launch site for small trailed fishing boats and tenders.

7.3.3.4 Cables (interconnectors and telecom)

There are six submarine cables (all telecom) of relevance to consider in this Scoping Study. Listed in terms of nearest proximity to the PDZ, these are:

- ‘Gemini North – Segment 2’, disused, Vodafone;

- ‘Solas’, active, Vodafone’
- ‘Tata Atlantic North’, active, Tata Telecoms;
- ‘PTAT’, status unknown, Vodafone; and
- ‘Tata W. Europe UK-Portugal’, active, Tata Telecoms.

One disused cable ‘Gemini North – Segment 2’, owned by Vodafone, passes through the southern portion of the PDZ (Figure A7.3.1, Appendix A). There are also two confirmed active subsea telecom cables just south of the PDZ, one of which lies very close (250m) to the southern boundary of the PDZ. These two cables (‘Solas’ and ‘Tata Atlantic North’) are operated by Vodafone and Tata Communications. Further south, there are two other cables; the status of ‘PTAT’ is unknown and the other ‘Tata W. Europe UK-Portugal’ is active (see Figure A7.3.1, Appendix A). Further south, there are two other cables; the status of ‘PTAT’ is unknown and the other ‘Tata W. Europe UK-Portugal’ is active (see Figure A7.3.1, Appendix A).

There is currently a proposal to install the Greenlink interconnector between Ireland and Wales. The preferred landfall point is identified as Freshwater West in the Greenlink Scoping Report. The proposed Erebus Floating Offshore Wind Farm aims to use a single offshore export cable, up to 49 km in length, making landfall nearby to the Greenlink project at West Angle Bay (Blue Gem Wind, 2021).

7.3.3.5 Oil and gas extraction

There is no existing or proposed oil and gas extraction (nor gas storage and carbon capture storage) infrastructure in proximity to the PDZ and potential cable export routes. Neither are there blocks in recent licensing rounds on offer in proximity to the PDZ and potential cable export routes (the nearest licensed block is 43 km away). There is one historic exploratory wellhead some 15km away from the PDZ.

7.3.3.6 Aggregate extraction

There are no existing licenced, application or option areas in proximity to the PDZ. The nearest is NOBEL Banks approximately 25 km east of the PDZ area in the Bristol Channel.

7.3.3.7 Renewable energy

The agreement for lease area of the planned 100MW Project Erebus Floating Wind Farm lies approximately 21km west of the offshore PDZ area. Llŷr 1 and Llŷr 2, two 100MW floating wind farms in the early planning stages, lie 13km southwest and 5km south of the PDZ area, respectively. WhiteCross, another planned 100MW floating windfarm, lies approximately 30km to the south of the PDZ area.

7.3.4 Potential Impacts

A summary of potential impacts on Coastal and Marine Infrastructure and Other Users is set out in Table 7.6.

Table 7.6 Summary of Key Sensitivities and Potential Impacts for Coastal and Marine Infrastructure and Other Users

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Military activity	Interference with MoD operations including radars communication and surveillance systems, seismological recording equipment, communications facilities, naval operations and	Yes	This impact is screened in on a precautionary basis, as the risk of potential interactions of the MOS platform with

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
	low flying. This could impact on MoD monitoring of shipping into their danger areas.		military radar are not yet known.
Disposal sites and Other Users	Risk of unexploded ordinance in a closed ammunitions dumps site if this is crossed by a potential export cable route, during installation, maintenance and possibly decommissioning.	No	Due to the extensive nature of surveys required for UXO identification, this impact is better informed and assessed through a standalone Marine License Report post-consent and pre-construction, when cable routes and PDZ MOS platform siting are frozen in the design process and consented.
Disposal sites	Risk of sedimentation plumes settling on potential cable routes (or vice versa) from disposal sites.	Yes	The likelihood of this impact occurring will depend upon the final choice of the offshore export cable route. This impact may therefore be scoped out following refinement of the Project design.
Cables	Project activity (construction, maintenance and decommissioning) could interact with active and disused telecom cables in proximity to the PDZ.	Yes	This impact is scoped in, but it is expected that micrositing of infrastructure will mitigate the risk.
Cables	The planning and installation of the proposed Greenlink interconnector could be affected by this proposal. This could potentially incur Project delays.	Yes	Greenlink project is still a live project at planning stage. Overlap with the PDZ study area exists.
Cables and floating wind turbines	The planning and installation of the proposed Project Erebus Floating Wind Farm could be affected by this proposal. This could potentially incur Project delays.	Yes	Project Erebus is still live and is at planning stage. Overlap with the PDZ study area exists.
Cables and floating wind turbines	The planning and installation of the proposed Llŷr 1 and Llŷr 2 floating wind farms could be affected by this proposal. This could potentially incur Project delays.	Yes	Llŷr 1 and Llŷr 2 is still live and is at planning stage, cable routes are currently unknown. Overlap with the PDZ study area exists.
Operational Phase			
Military activity	Interference with MoD operations including radars communication and surveillance systems, seismological recording equipment, communications facilities, naval operations and	Yes	This impact is screened in on a precautionary basis, as the risk of potential interactions of the MOS platform with

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
	low flying. This could impact on MoD monitoring of shipping into their danger areas.		military radar are not yet known.
Disposal sites And Other Users	Risk of unexploded ordinance in a Closed ammunitions dumps site if this is crossed by a potential export cable route, during installation, maintenance and possibly decommissioning.	No	Due to the extensive nature of surveys required for UXO identification, this impact is better informed and assessed through a standalone Marine License Report post-consent and pre-construction, when cable routes and PDZ MOS platform siting are frozen in the design process and consented. Disposal sites will be avoided as a priority during cable route optioneering.
Disposal sites	Risk of sedimentation plumes settling on potential cable routes (or vice versa) from disposal sites.	Yes	The likelihood of this impact occurring will depend upon the final choice of the offshore export cable route. This impact may therefore be scoped out following refinement of the Project design.
Cables	Project activity (construction, maintenance and decommissioning) could interact with active and disused telecom cables in proximity to the PDZ.	Yes	This impact is scoped in, but it is expected that micrositing of infrastructure will mitigate the risk.
Cables	The planning and installation of the proposed Greenlink interconnector could be affected by this proposal. This could potentially incur Project delays.	Yes	Greenlink project is still a live project at planning stage. Overlap with the PDZ study area exists.
Cables and floating wind turbines	The planning and installation of the proposed Project Erebus Floating Wind Farm could be affected by this proposal. This could potentially incur Project delays.	Yes	Project Erebus is still live and is at planning stage. Overlap with the PDZ study area exists.
Cables and floating wind turbines	The planning and installation of the proposed Llŷr 1 and Llŷr 2 floating wind farms could be affected by this proposal. This could potentially incur Project delays.	Yes	Llŷr 1 and Llŷr 2 is still live and is at planning stage, cable routes are currently unknown. Overlap with the PDZ study area exists.
Oil and Gas installations	Project activity (construction, maintenance and decommissioning) could interact with active and disused oil and gas installations in proximity to the PDZ.	No	There are no Oil and Gas installations in the Celtic Sea area surrounding the PDZ.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Decommissioning Phase			
Decommissioning impacts are anticipated to be similar in nature to construction.			
Cumulative Impacts are scoped in for this receptor group			

7.3.5 Potential Mitigation

The following mitigation is proposed for the Project:

- Consult with relevant stakeholders will be at an appropriate stage where there is a risk of potential conflicts with other infrastructure, owners and operators
- Identify appropriate mitigation measures and legal agreements for consideration in consultation with key stakeholders (for example opportunities for avoiding interactions through project design and routing).

7.3.6 Environmental Assessment Approach

CSP will undertake consultation with all relevant developers, operators and marine users who have existing or planned operations in vicinity to the Project, in order to ascertain any concerns relating to the Project, and potential risk of interactions. However, it is likely that impacts will be non-significant or they can be readily mitigated, following consultation with the relevant parties as outlined above. Specific proposed further consultations are provided in Table 7.7.

Table 7.7 Proposed Additional Data Collection for Coastal and Marine Infrastructure and Other Users

Data requirement	Method	Purpose/Rationale
Consultation with MoD Safeguarding Team, Defence Infrastructure Organisation in relation to MoD activities and operations.	Consultation should be initiated via the standard online MoD preapplication proforma. The minimum information required is: maximum hub height above ground level; rotor diameter; ordnance survey grid reference for each turbine; and, generation capacity.	Given the expected MOS platform height of 45m above sea level, interference with radar is unlikely. However, in adherence to Civil Aviation Authority guidance (CAP 764), the MoD safeguarding team should be consulted with regard to the development proposal (see Section 0 for more detail). This will ascertain any potential risk of interactions of the MOS platform with military radar, communication and surveillance systems etc.

Data requirement	Method	Purpose/Rationale
Consultation with marine cable operators (e.g. Vodafone and Tata Communications).	Direct consultation.	To ascertain any potential risks of interactions with cable operations and to set up legal agreements and identify required mitigation measures.
Consultation with renewable projects and transmission projects (e.g. GreenLink and Project Erebus).	Direct consultation.	To ascertain any potential risks of interactions with cable operations and to set up legal agreements and identify required mitigation measures.

7.4 Aviation and Radar

This section describes the aviation and radar baseline environment and potential effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

7.4.1 Data and Information Sources

Any assessment of the impact of the proposed scheme upon aviation and radar must adhere to the following guidance, produced by the UK Civil Aviation Authority (UKCAA):

- CAP 670: The Air Traffic Services Safety Requirements (2014 version and 2019 update)
- CAP 764: Policy and Guidelines on Wind Turbines
- CAP 437 Standards for Offshore Helicopter Landing Areas (last updated in 2021).

Whilst the proposed scheme entails one MOS and no wind turbines, it is prudent to still adhere to CAP 764, as the proposed scheme is likely to be linked to future wind farm developments (proximity as yet unknown). The proposed scheme also includes helicopter landing areas, hence CAP 437 is a consideration.

As well as UKCAA guidance, the MCA also provides relevant guidance. With regard to offshore helicopter operations from and to a MOS, reference should be made to Maritime Guidance Note 543 (and MGN 654). This states that the MCA should be consulted at the earliest opportunity (MCA, 2021). A Navigational Risk Assessment will need to be submitted in accordance with MGN 543/654 and the MCA's 'Methodology for Assessing the Marine Navigational Safety Risks & Emergency Response of Offshore Renewable Energy Installations'.

7.4.2 Study Area

The aviation and radar baseline is based on a desktop study of readily available data provided by National Air Traffic Services (NATS). To determine the Study Area for the assessment of impacts on aviation and radar NATS 'self-assessment maps' have been used (NATS, 2022). These comprise layers which capture potential interactions with air-ground-air (AGA) communication stations, navigation aids and secondary surveillance radar operated by NATS En Route Plc. (NERL) in the UK. MoD low flying operations were reviewed (MoD, 2021) and maps of consultation zones for weather radar and radio sites in the UK (Met Office, 2022) were also consulted.

7.4.3 Existing Environment

7.4.3.1 Airports

The nearest commercial airport to the Study Area is Cardiff, approximately 115 km away. Others are located at Bristol, Exeter and Newquay.

7.4.3.2 Military Operations and Airfields

The PDZ exists within Low Flying Area 7, a Night Low Flying Area, thus the Ministry of Defence (MOD) should be consulted on navigational aids (lighting) upon the MOS to maintain the safety of military flying activity. The military UK Low Flying System (UKLFS) covers the open airspace about the whole UK land and immediate seas out to 2 nautical miles (NM) from the coast, from the surface to 2,000 ft above ground or sea level (MoD, 2021). Military low flying may, however, be conducted outside this area over the sea.

RAF squadrons operate out of MoD St Athan in the Vale of Glamorgan and RAF Valley in Anglesey, both within 200 km of the PDZ.

7.4.3.3 National and International Air Traffic Services

The world is divided into Flight Information Ranges (FIR) for air traffic control. The London FIR covers England and Wales, including the Study Area. The London FIR is split into UK Airspace Sectors. The boundary of two sectors (Brecon and Berryhead) crosses the Study Area.

Each FIR is managed by a controlling authority that has responsibility for ensuring that air traffic services are provided to the aircraft flying within it. The UK Civil Aviation Authority (UKCAA) is the regulatory authority for the London FIR and air traffic services are provided by NERL (NATS, 2017b). NERL has extensive infrastructure in place across the UK, to ensure that aircraft flies safely and efficiently; comprising of radars, communication systems and navigational aids.

7.4.3.4 Primary and Secondary Surveillance Radars

There are only three primary surveillance radars located near to the PDZ (approximately 85 km away). One is located near Bideford in North Devon and two more are located near Boscastle in North Devon.

The maximum design height of the offshore platform which is currently being considered is 45m, with a limited height range for line of sight to the primary surveillance radars. However, given the precise location of the proposed MOS within the PDZ is not yet confirmed, the risk of the MOS falling within line of sight of at least one of the primary surveillance radars operated or used by NERL, which provides en-route services to civil and military aircraft, will be explored with the UKCAA.

It should be noted that effects on secondary surveillance radar (SSR) are only relevant to consider when installations are located less than 10 km from the SSR (which is not the case here).

7.4.3.5 Aeronautical Navigation Aids and Communication Systems

There is no evidence to indicate offshore substations could affect navigation aids and communication systems, such as interference between air traffic controllers and aircraft under their control. However, further assessment on this aspect should adhere to CAA CAP 670 guidance and be explored further with the UKCAA.

7.4.3.6 Meteorological Radar Systems

The closest UK weather radar site to the Project Area is at Crug-y-Gorllwyn, greater than 30 km north east of the Project Area.

7.4.3.7 Aviation and Radar Receptors

The following receptors and receptor groups should be considered:

Aircraft

- Civil airport patterns and procedures
- Military aerodrome patterns and procedures
- Military low flying

Primary Surveillance / Military Radar Systems

- Military Air Defence (AD) radar systems

Aeronautical navigation aids and communication systems

- Military Air Traffic Control (ATC)
- Civil ATC radar

Offshore helicopter operations

- Helicopter Main Routes (HMR)
- Offshore helicopter installations (oil and gas platforms)
- Offshore helicopter operations (including, but not limited to Search and Rescue (SAR))

Meteorological Radar Systems

- Meteorological Radar Systems.

7.4.4 Potential Impacts

A summary of potential impacts on Aviation and Radar is set out in Table 7.8.

Table 7.8 Summary of Key Sensitivities and Potential Impacts for Aviation and Radar

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Aircraft (commercial, private and military)	Increased collision risk (risk will gradually increase as structure height increases).	Yes	Due to potential interactions with installation (up to 45m). Plus, risk of collision due to interference with radar and communications systems. This is unlikely but should be scoped in until confirmed with UKCAA.
Primary Surveillance Radar	Physical obstruction of installations and the generation of unwanted returns (returns that are not aircraft) to radar.	Yes	Risk of aircraft collision as a consequence of interference with radar.
Aeronautical navigation aids and communication systems	Possibility of installations interfering with radio communication between Air Traffic Controllers and aircraft under their control.	Yes	This is unlikely but should be scoped in until confirmed with UKCAA.
Offshore helicopter operations	Risk of interaction between search and rescue helicopter service in the UK, flying at low levels.	Yes	Risk of interaction between rescue helicopter service in the UK flying at low levels. This is unlikely but should be scoped in until confirmed with UKCAA.
Meteorological Radar Systems	Physical obstruction of installations interfering with meteorological radar waves.	No	Project Area is outside all consultation zones for the closest UK weather radar site at Crug-y-Gorllwyn.
Operation Phase			
Potential impacts are the same as for Construction Phase, but with a reduced risk of affecting offshore helicopter operations as the MOS will not itself generate much traffic during operations.			
Decommissioning Phase			
Potential impacts are the same as for Construction Phase, but with risks reducing over time as the structure reduces in height.			

7.4.5 Potential Mitigation

The mitigation proposed is as follows:

- Mitigation measures should be explored at the earliest opportunity with relevant authorities (UKCAA, MCA, MoD);
- Close adherence to various guidance documents as specified above;
- Potential to fit aviation warning lighting to MOS roof deck, and the marking of MOS location on aeronautical and nautical charts; and

- Other mitigation may, for example, include re-routing helicopters around the MOS.

7.4.6 Environmental Assessment Approach

To refine understanding of the risk of potential aviation and radar interactions within the PDZ, the UKCAA, MCA and MoD should be consulted as part of the next stage of the environmental assessment process. As part of that consultation the engagement process going forward can be agreed, and any potential design opportunities can be identified to help mitigate the risk of any negative effects. A pre-planning assessment should be arranged to aid this process, and all guidance documents specified in this section should be reviewed and followed.

7.5 Archaeology and Cultural Heritage

This chapter was produced by RHDHV. This section describes the approach to assessing the potential archaeology and cultural heritage effects associated with the construction, operation and decommissioning of the Project.

The Welsh National Marine Plan includes the following policy of relevance to Archaeology and Cultural Heritage:
Policy SOC_05, Historic assets –

"Proposals should demonstrate how potential impacts on historic assets and their settings have been taken into consideration and should, in order of preference:
a. avoid adverse impacts on historic assets and their settings; and/or
b. minimise impacts where they cannot be avoided; and/or
c. mitigate impacts where they cannot be minimised.
If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding.
Opportunities to enhance historic assets are encouraged."

In addition, new guidance on the management of the marine historic environment in Wales was published by Cadw in 2020 in order to set out the Welsh Government's approach to the marine historic environment and best-practice guidance for its protection and management. This guidance (Cadw 2020: 3) defines the marine historic environment as, "places under the sea and in the intertidal zone where evidence for human

activity is preserved" and includes shipwrecks and aircraft, submerged landscapes and the physical traces, traditions, tales and beliefs demonstrating the relationship between land and sea as a place of work for fishermen, mariners and the armed forces. The guidance (Cadw 2020: 30-39) also provides best practice advice on heritage impact assessment which should show how potential impacts on historic assets and their settings have been taken into consideration at an early stage and what action is proposed to avoid, minimise or mitigate any adverse impacts.

7.5.1 Data and Information Sources

This chapter has been informed by the following datasets:

- A Research Framework for the Archaeology of Wales (IFA Wales, 2022);
- West Coast Palaeolandscapes Study (Dyfed Archaeological Trust, 2013);
- Milford Haven Area Historic Landscape Characterisation (Cadw, 2001);
- National Historic Assets of Wales (Cadw, 2017); and

NRW Lle Geo-Portal (2022)

7.5.2 Study Area

The Study Area for this topic encompasses the onshore and offshore components of the Project Area (Figure 2.1).

7.5.3 Existing Environment

7.5.3.1 Offshore Archaeology and Cultural Heritage

Offshore, there are no protected wrecks within the vicinity of the proposed Project. The closest Welsh designated wreck site is 'The Smalls' (Designation Order: (No 1), No 2654, 1995) (Appendix A, Figure A7.5.1). This site on The Smalls reef represents the location of the discovery of an 11th century sword hilt guard between isolated rocks to the south of the Smalls lighthouse. However, the Smalls are located approximately 35 km west of the western boundary of the Project Area and therefore outwith the Study Area and excluded from further consideration. The closest English wreck sites designated under the Protection of Wrecks Act 1973 are the 'Gull Rock' (Designation Order: (No 1), No 234, 1990) and 'Iona II' (Designation Order: (No 2), No 2294, 1989) wreck sites. The 'Gull Rock' site contains the remains of a wreck thought to be of fifteenth- to sixteenth-century, indicated by an assemblage of cannon and shot on the site. The 'Iona II' site contains the remains of an 1864 wreck of American paddle steamer. These sites are located in the waters immediately to the east of Lundy Island, and approximately 30km southeast of the Project Area and therefore outwith the Study Area.

Based on the SeaZone wreck database, there are large numbers of non-designated wrecks and documented losses of vessels and aircraft around the coast of Pembrokeshire (Appendix A, Figure A7.5.1).

Thus, there is a high potential for both previously undiscovered and known wrecks and aircraft to be present within the Project Area. However, the preservation potential of the marine environment is limited within the Project Area by shallow sand coverage (and limited burial potential) within a high energy environment, see sediment description within Section 5.1 (Coastal Marine Processes).

This suggests that potential for the discovery of previously undiscovered wrecks is low within the Study Area in comparison, for example, to marine areas where there is substantial sand coverage and correspondingly higher potential for burial.

7.5.3.2 Onshore Archaeology and Cultural Heritage

Onshore, designated sites adjacent to and the vicinity of the landfall options and proposed cable routes along public highways are as follows (Appendix A, Figure A7.5.2).

In the vicinity of the proposed landfall at Freshwater West there are two Scheduled Monuments and three Listed Buildings:

- Gravel Bay anti-aircraft battery Schedules monument, a WWII situated in enclosed coastal pasture overlooking Freshwater West beach and Gravel Bay to the south;
- Devil's Quoit Burial Chamber, a Neolithic chambered tomb in the middle of a farm land c. 500 metres from the sand dunes of Broomhill Burrows;
- Grade II Listed War Memorial on the west side of the Angle to Castlemartin road, on the headland overlooking Freshwater West Bay;
- Grade II Listed Rocket Cart House, built as a base for cliff-rescue teams at the end of the 19th century and located on the north side of the B4320; and
- Grade II Listed Lookout Tower on the north side of the B4320 at Rocket Cart House.

The nearest designated site to Bullslaughter Bay is the Scheduled Crocksydam Camp promontory fort located on a narrow coastal promontory above the sea to the West of the bay.

There are 24 Conservation Areas designated by Pembrokeshire County Council although the proposed Project footprint does not correspond to any of the designated areas. Milford Haven Conservation Area is located northeast of the Freshwater West landfall and Pembroke Dock, also to the northeast of the landfall is designated as a Conservation Area. To the west there is a further Conservation Area around the village of Angle.

In addition to these designated sites, there are also a large number of non-designated heritage assets. These assets provide evidence of human activity from early Prehistoric through to modern times and a full assessment of these will be required as part of the Environmental Appraisal (see Section 7.5.6).

7.5.4 Potential Impacts

Direct impacts to heritage assets which result in damage to or destruction of archaeological material or its physical setting (context) are permanent and, as there is no way to replace what is lost, all direct impacts to heritage assets would be of major significance. Any works which disturb the seafloor or sub-seabed, or sub-surface deposits on land, have the potential to directly impact buried archaeology including:

- Seabed preparation;
- Installation of foundations for the MOS;
- Installation of cables and cable protection;
- Anchors of vessels during construction or maintenance activities; HDD and cable burial within the intertidal zone at the landfall;

- Excavation of cable transition pits/joint bays to connect offshore and onshore cables above MHWS;
- Installation of onshore cables and substation (if required); and
- Construction of associated onshore infrastructure, such as working compounds etc.

Indirect impacts to heritage assets may also occur if changes to hydrodynamic and sedimentary processes trigger degradation to heritage assets as a result of changes in physical, biological or chemical processes. These may subsequently affect the associated settings of heritage assets and historic character of the seascape or landscape associated with the Project.
Projects may have a positive, neutral or negative affect upon the character of a place, whether offshore or onshore. The project also has the potential to have a positive effect through the acquisition of new geophysical and geotechnical data and the results of fieldwork which will contribute to an understanding of archaeology in Wales. The scale of this beneficial impact will depend upon the completion of studies to professional archaeological standards and the publication of results in line with standards and guidance including the Research Framework for the Archaeology of Wales.

A summary of potential impacts is set out in Table 7.9.

Table 7.9 Summary of Key Sensitivities and Potential Impacts for archaeology and cultural heritage

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Buried Archaeological/ (Palaeo) Environmental Remains	Direct damage or destruction of archaeological remains within the footprint of the proposed Project.	Yes	Direct impacts to archaeological material are permanent and without mitigation would be of major significance.
Wrecks and Crashed Aircraft	Direct damage or destruction of remains within the footprint of the proposed Project.	Yes	
Marine and Intertidal Heritage Assets	Indirect impacts associated with changes to marine and coastal processes.	Yes	Exposure of buried archaeological remains following changes to marine or costal processes could results in increased degradation of those remains. Conversely, increased burial of remains previously exposed to marine processes could be considered a positive impact.
Heritage Assets	Impacts to the setting of heritage assets.	Yes	Although likely to be considered small scale and temporary, construction activities could negatively

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
			affect the setting of heritage assets within the vicinity.
Historic Landscape and Seascape	Changes to the historic character of the Study Area.	Yes	Although likely to be considered small scale and temporary, construction activities will result in a change to the character of the historic landscape and seascape.
Current Archaeological Research In Wales	Potential beneficial impact of published fieldwork results and archaeologically assessed geophysical and geotechnical data.	Yes	The acquisition of new information through fieldwork and the acquisition of geophysical and geotechnical data could significantly contribute to an understanding of the archaeology of Pembrokeshire and therefore is a positive impact.
Operational Phase			
Buried Archaeological/ (Palaeo) Environmental Remains	Direct damage or destruction of archaeological remains within the footprint of the proposed Project.	No	As the majority of the onshore project infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), this element of the operational project will have limited potential to further impact the onshore archaeology and cultural heritage resource.
Wrecks and Crashed Aircraft	Direct damage or destruction of remains within the footprint of the proposed Project.	Yes	Direct impacts may occur if archaeological material is present within the footprint of works required for routine maintenance activities which disturb the seabed (for example, seabed contact by legs of jack-up vessels and / or anchors).
Marine and Intertidal Heritage Assets	Indirect impacts associated with changes to marine and coastal processes.	Yes	Exposure of buried archaeological remains following changes to marine or costal processes could results in increased degradation of those remains. Conversely, increased burial of remains previously exposed to marine processes could be considered a positive impact.
Heritage Assets	Impacts to the setting of heritage assets.	Yes	The introduction of new industrial elements and activities could negatively affect the setting of heritage assets within the vicinity.
Historic Landscape And Seascape	Changes to the historic character of the Study Area.	Yes	The introduction of new industrial elements and activities will result in a change to the character of the historic landscape and seascape.
Decommissioning Phase			
Buried Archaeological/ (Palaeo) Environmental Remains	Direct damage or destruction of archaeological remains within the footprint of the proposed Project.	Yes	If cables and foundations are left in place there would be no potential for direct impact. Direct impacts to heritage assets may occur if the accessible infrastructure is removed, although the anticipated effect on archaeological material would be limited as any remains at the locations of the

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
			installed infrastructure will already have been impacted/mitigated during the construction phase.
Wrecks and Crashed Aircraft	Direct damage or destruction of remains within the footprint of the proposed Project.	Yes	If archaeological material is present within the footprint of jack-ups or vessel anchors deployed during decommissioning activities, direct impacts may occur.
Heritage Assets	Impacts to the setting of heritage assets.	Yes	It is anticipated that the decommissioning impacts could be similar in nature to those of construction, depending on the extent and depths to which any further intrusive sub-surface decommissioning groundworks may occur.
Historic Landscape And Seascape	Changes to the historic character of the Study Area.	Yes	
Cumulative Impacts are scoped in for this receptor group			

7.5.5 Potential Mitigation

The mitigation proposed for the Project is as follows:

- Avoidance of known heritage assets (preservation in situ):
  - Implementation of Archaeological Exclusion Zones (AEZ) around identified marine heritage assets;
  - Micro-siting of design to avoid marine geophysical anomalies of possible archaeological interest; and
  - Micro-siting of design to avoid known, onshore heritage assets.

- Further investigation and excavation of heritage assets which cannot be avoided (preservation by record):
  - Geoarchaeological assessment and the production of a Quaternary Sedimentary deposit model;
  - Further investigation of marine heritage assets through the acquisition of high resolution geophysical data, Remote Operated Vehicle (ROV) or diver survey;
  - Onshore fieldwork/excavation including set-piece (open-area) excavation, strip, map and record (or sample) excavation and watching briefs (targeted and general).
  - Adherence to the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Crown Estate, 2010) to address unexpected discoveries of archaeological material during construction offshore.

7.5.6 Environmental Assessment Approach

The acquisition and archaeological interpretations of geophysical survey data will form a fundamental part of data acquisition for the EIA. This data, interpreted in conjunction with existing records of wrecks, obstructions and documented losses will help to establish the full nature and extent of wrecks, crashed aircraft and geophysical anomalies of possible archaeological interest within the offshore development footprint. Similarly, new geophysical and geotechnical data acquired within the Project Area will provide a

key opportunity to extend the results of the WCPS further west, thereby resulting in a potential positive/beneficial impact for research on the submerged landscapes of Wales.

In line with requirements specified in Planning Policy Wales, Note 24 (Cadw, Welsh Government, 2017a), the data collection required in order to achieve a proportionate assessment for archaeology and cultural heritage is summarised in Table 7.10 below.

Table 7.10 Proposed Additional Data Collection for Archaeology and Cultural Heritage

Data requirement	Method	Purpose/Rationale
Records held by Cadw on designated sites	Request record search from the defined Study Area directly from Cadw.	To identify the nature and extent of designated heritage assets which could be impacted by the Project.
Information held by Pembrokeshire County Council on conservation area and assets of local interest	Information available online on the county council website or from Dyfed Archaeological Trust as archaeological advisors to Pembrokeshire County Council.	To identify the nature and extent of historic areas and locally designated assets which could be impacted by the Project.
Records from the HER maintained by Dyfed Archaeological Trust	Request record search from the defined Study Area directly from Dyfed Archaeological Trust.	To identify the nature and extent of non-designated heritage assets which could be impacted by the Project.
Records from the National Monuments Record of Wales, held by RCAHMW	Request record search from the defined Study Area directly from RCAHMW.	To identify the nature and extent of non-designated heritage assets which could be impacted by the scheme and to use records of maritime and aviation losses to assess the potential for previously undiscovered wrecks and aircraft offshore.
Records of wrecks and obstructions held by the UKHO	Request record search from the defined Study Area via a third party provider (e.g. SeaZone or OceanWise).	To identify the locations of wrecks and obstructions previously recorded within the Study Area and to evaluate their archaeological potential.
Geoarchaeological assessment of geotechnical data	Specialist geoarchaeological contractor required to undertake assessment of geotechnical survey data provided by CSP's geotechnical contractor.	To investigate the presence of sub-surface archaeological deposits and palaeoenvironmental data for geoarchaeological assessment and analysis and the production of a Quaternary Sedimentary deposit model (this is in part a mitigation measure as well as a data requirement).
Archaeological assessment of marine geophysical data	Specialist archaeological contractor required to undertake assessment of geophysical survey data provided by CSP's geophysical contractor.	To identify the locations of wrecks, aircraft crash sites and geophysical anomalies of possible archaeological interest.

Data requirement	Method	Purpose/Rationale
Targeted investigation and survey of areas of archaeological potential onshore	Walkover surveys/site visits to ground truth the results of the DBA and undertake settings assessments if required. Geophysical survey, metal detecting, fieldwalking, earthworks surveys and trial trenching would be undertaken by a specialist archaeological contractor in conjunction with CSP (either full or in part).	To provide further information on the presence of buried archaeological remains within the onshore cable corridors and substation sites.
Results of specialist assessments undertaken for the project	Modelling associated with marine geology, geomorphology and sedimentary processes and marine coastal processes and with landscape, seascape and visual impacts.	To provide detailed assessment of changes to hydrodynamic and sedimentary process which may indirectly impact heritage assets. To understand the interaction of elements of the project with the setting of heritage assets.
Historic maps and charts, aerial photography and LiDAR data	Data from third party providers and online resources as applicable.	To provide further information on the historic landscape/seascape and on the potential for heritage assets to be present within the Study Area.
Secondary sources and archaeological research	Search of online and published sources.	To provide contextual information relating to the archaeology and character of the Study Area.

Where required, the scope of archaeological assessment and surveys will be agreed in consultation with Cadw, as statutory advisors on the marine historic environment in Wales, and Dyfed Archaeological Trust as planning advisers to Pembrokeshire County Council. Consultation will be undertaken at key stages throughout the assessment process with these organisations and other relevant stakeholders.

7.6 Land Use

This chapter was produced by RHDHV. This section describes the approach to assessing the potential land use effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

This section focuses on permanent types of land use within the Study Area (e.g. housing, employment, agriculture). It is recognised that new infrastructure can also affect how people interact with the landscape, e.g. changes in visual amenity altering people's enjoyment of an area, and potentially affecting where people chose to visit or live. For this Scoping Assessment, those effects are considered within Section 7.8 (Landscape, Seascape and Visual Impacts) and Section 7.12 (Tourism and Recreation).

This chapter has considered the National Planning Policy in Wales as set out in The Welsh Government, Planning Policy Wales. Edition 11. (2021).

7.6.1 Data and Information Sources

Key data used to inform the baseline of the Scoping Report were retrieved from the following sources:

- MAGIC Interactive Map;
- Pembrokeshire County Council Pembrokeshire Local Development Plan;
- PCNPA Pembrokeshire Coast National Park Local Development Plan 2 and Proposals Maps (PCNPA, 2020);
- PCNPA Management Plan 2020-2024 (PCNPA, 2019);
- PCNPA Seascape Character Assessment Interim Supplementary Planning Guidance (PCNPA, 2020);
- MoD Defence Estates Public Information Leaflet;
- Terrestrial Phase 1 Habitat Survey for Wales (completed in 1997 by CCW; digital data
- downloaded from NRW) ; and

Welsh Government Predictive Agricultural Land Classification (ALC) Map for Wales.

7.6.2 Study Area

The Study Area for this topic encompasses the onshore and component of the Project Area (Figure 2.1).

7.6.3 Existing Environment

7.6.3.1 Settlements

The main population centres are in the north-northwest corner of the Castlemartin Peninsula: Pembroke Dock on the south shore of Milford Haven waterway, and Pembroke Town located slightly further inland on Pembroke River. The rest of the Castlemartin Peninsula is predominantly rural, characterised by farmsteads and village settlements including but not limited to Hundleton, Maiden Wells, St. Twynnells, Pwllcrochan and Rhoscrowther. There is a field centre at Orielton. The Pembrokeshire Local Development Plan includes areas of housing allocation within the settlement boundaries of Pembroke Town, Pembroke Dock and Hundleton.

7.6.3.2 Business, Industry and Energy Generation

The two main industrial areas in the Study Area are Pembroke Power Station (operated by RWE) the Pembroke Oil Refinery and Pembroke Combined Heat and Power (CHP) Cogeneration Unit at Rhoscrowther (operated by Valero). Both sites are situated on the south shore of Milford Haven waterway, west of Pembroke River. Pembroke Dock is also an important employment centre.

Land at the power station and refinery sites is allocated for the provision of new waste management facilities in the adopted Pembrokeshire Local Development Plan (Policy GN.40 New Waste Management Facilities). There are also areas allocated for employment in Pembroke Dock.

7.6.3.3 National Park

The coastline from Stackpole in the southwest corner of the Castlemartin Peninsula round to the former oil refinery at Rhoscrowther is within the Pembrokeshire Coast National Park. The area within the national park extends by between approximately 3 km and 4.5 km inland from the south and west coasts. The National Park has its own Local Development Plan and a Management Plan (PCNPA, 2020; 2019). The purpose of National Parks is to conserve and enhance the natural beauty, wildlife and cultural heritage of

the areas; and, promote opportunities for the understanding and enjoyment of the special qualities of national parks by the public. Most land within the Pembrokeshire Coast National Park is privately owned.

7.6.3.4 Military

The Castlemartin Training Area covers approximately 2,390 hectares of land in the south of the peninsula (Defence Estates, 2022) between Frainslake Sands on the west coast and St Govans Head at the southwest corner, including Merrion Camp, the headquarters of the MoDs Pembrokeshire Training Estate. All of the training area is within the Pembrokeshire Coast National Park.

7.6.3.5 Agriculture

The land located between the Castlemartin Training Area and the built up areas along Milford Haven Waterway is predominantly agricultural, comprising pasture fields interspersed with areas of arable land. The Predictive Agricultural Land Classification (ALC) Map for Wales shows the majority of the interior of Castlemartin Peninsula as being ALC Grade 2 (good quality agricultural land), with bands of ALC Grades 3a (good to moderate quality) and 3b (moderate quality) around the south and west coasts and to the south of Pembroke. Land of classified as ALC Grades 1 to 3a comprises ‘best and most versatile land’ under Planning Policy Wales which is able to best deliver food and non-food crops. There are also pockets of Grade 4 (poor) and non-agricultural land. It should be reiterated that this classification is predictive, and that the ALC grade of a particular land parcel can only be confirmed through detailed ALC survey in accordance with the the former Ministry of Agriculture, Fisheries and Food (MAFF, now Defra) guidelines (MAFF, 1988).

7.6.4 Potential Impacts

The scope of effects with regard to Land Use are summarised in

Table 7.11. The effects on land use during and after beyond Project decommissioning may depend on whether redundant infrastructure is removed or left in situ. That decision would be made during detailed decommissioning planning.

Table 7.11 Summary of Key Sensitivities and Potential Impacts for Land Use

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Settlements: existing and known future plans	No impacts predicted.	Yes	Conservatively scoped in: Onshore cable routes originating from landfalls such as Freshwater East may interact with the settlements such as Freshwater East and Stackpole. This may be appropriately scoped out of upcoming EIA following reduction of landfall options and cable routing via ongoing constraints analysis.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Business, Industry and Energy Generation: existing and known future plans	No impacts predicted.	No	An onshore cable route will not need to pass through any existing industrial areas or areas allocated for future business, employment or power generation development. Having the grid connection at Pembroke Power Station will not significantly affect future development of land within or around the Power Station for other uses.
Unknown future development	Installation and long-term presence of onshore cables could affect future development; land 'sterilisation'.	Yes	The presence of below ground cables could place restrictions on future changes to land use, e.g. restrictions on construction of buildings directly above or below electrical wires; restrictions on installation of other services. Cables left in situ at decommissioning could also affect future development costs.
National Park (Bullslaughter Bay, New Quay Beach, Freshwater East, Broadhaven South, Greenala Point, Freshwater West Landfall Options)	Installation and long-term presence of landfall site infrastructure, substation and onshore cables within National Park, affecting use and management of the land.	No (for land use)	Presence of onshore cables will not affect access to or use of the National Park by residents and visitors, or change the management objectives of the Parks Authority. There may be some temporary disruption to access during construction, but this would not affect long-term use of the land
Military (Bullslaughter Bay, New Quay Beach, Greenala Point Freshwater East, Broadhaven South Landfall Options)	Installation and long-term presence of below ground and above ground infrastructure restricting MoD training activities.	No	The option for a landfall point and onshore cabling through the Castlemartin Training Area would only be progressed if the MoD agreed to the proposals. Therefore, although this may be important for determining the final design, it would not be a significant issue for a future EIA. Details of any agreement reached would likely need to be submitted as an appendix to the EIA for information purposes.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Agriculture	Installation and long-term presence of onshore cabling across farm land. Temporary loss of land during construction; reduced quality of land after reinstatement; permanent loss of farmable land to footprint of belowground easements or overhead transmission line pylons.	Yes	An onshore cable route from Bullslaughter Bay, New Quay Beach, Freshwater East and Broadhaven South landfall options would need to cross several km of 'best and most versatile' agricultural land, potentially affecting multiple farms and landowners / tenants if cables were not able to be installed within roads. This is also true of Freshwater West if onshore cables are not able to be installed within roads.
Operational Phase			
Operational impacts are anticipated to be similar in nature to construction.			
Decommissioning Phase			
Decommissioning impacts are anticipated to be similar in nature to construction.			
Cumulative Impacts are scoped in for this receptor group			

7.6.5 Potential Mitigation

Potential mitigation that will be considered during next design stage includes:

- Where required and technically feasible, install cables within existing roads to minimise effects on land use;
- Develop the onshore cable route and select infrastructure locations to avoid land that is earmarked for potential future development, and to avoid the most valuable agricultural land where possible, taking into account technical, financial and environmental feasibility;
- Work with landowners and tenants to identify the best locations for permanent infrastructure and temporary works to minimise temporary disruption and permanent changes in land use, taking into account technical, financial and environmental feasibility; and
- Plan construction techniques and post-construction reinstatement to enable temporarily affected land to be returned to its former condition.

7.6.6 Environmental Assessment Approach

Following receipt of Scoping Opinions, Project development work will be carried out to identify technically viable onshore cable route corridors between the potential landfall sites and the grid connection. Walkover surveys will be carried out to confirm existing and potential future land uses to assist the selection of a preferred cable route corridor. Liaison with local planning authorities, potentially affected landowners, and other developers, will also be necessary in the process of a preferred cable route corridor. An assessment of effects on land use will then be carried out for the preferred cable route. Table 7.12 summarises the data and surveys that are likely to be needed to inform Project design, appraisal and delivery.

Table 7.12 Proposed additional data collection for Land Use

Data Requirement	Method	Purpose/Rationale
Aspirations for future major development in the Castlemartin Peninsula.	Liaison with Pembrokeshire County Council and Pembrokeshire Coast National Park Authority.	Minimise the risk of the proposed cable route, as not to interfere with longer term aspirations for development.
Agricultural land use and quality along route corridor (e.g., pasture arable, crops being grown).	Consultation with potentially affected landowners and farmers.	To enable cable route development and selection of infrastructure locations (e.g. transition pit, substations, overhead transmission line pylons) to minimise effects on the most valuable agricultural land. To inform agreements with landowners.

7.7 Traffic and Transport

This chapter was produced by RHDHV. This section describes the approach to assessing the potential traffic and transport effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

The principle guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993.

7.7.1 Data and Information Sources

The Scoping Report is informed by a range of freely-available desk-based information, including:

- Interactive Maps and Data (Department of Transport, 2022);
- Pembrokeshire County Council Portal;
- Sustrans Online data (Sustrans, 2022); and
- Pembrokeshire Coast Trail (PCNPA, 2022).

7.7.2 Study Area

The Project Area comprises the PDZ, with six potential landfall options for the export cables; Freshwater West; Bullslaughter Bay; New Quay Beach; Broad Haven South; Greenala Point; and Freshwater East. The onshore cables from the landfall location to the National Grid connection point are expected to be buried (routing and land access consultation is ongoing). However, overhead cabling may be considered outside of the boundary of Pembrokeshire Coast National Park.

The proposed Study Area for traffic and transport therefore, includes the highway network between the six landfall locations and Pembroke Power Station (the location of landfall options and the Pembroke Power Station are shown on Figure 2.1. At this scoping stage, a preferred port for the offshore construction and maintenance of the Project has yet to be selected. Therefore, the Study Area does not extend to the consideration of potential ports.

7.7.3 Existing Environment

Highway access to all six of these potential landfall sites would require traffic to initially travel via the town of Pembroke and the A4139. The A4139 at this location carries approximately 7,000 to 9,000 vehicles daily (Department of Transport, 2022; annual average Daily Traffic Flows for count point 30663 and 77060), of which approximately 1-2% are HGVs.

Pembroke is linked to the wider highway network by three main 'A' roads. These are the A477 to the northeast, the A4075 and A477 to the southwest and the A4139 to the southwest.

There are three main 'B' roads from Pembroke that could be used to access the potential Study Area, these being the B4320 which heads west from Pembroke (for Pembroke Power Station grid connection point, and Freshwater West landfall site); the B4319 that heads south (for Bullslaughter Bay, New Quay Beach, and Broad Haven South landfall sites); and the B4584 that heads south east (for Freshwater East and Greenala Point landfall sites).

7.7.3.1 Pembroke Power Station

The B4320 heads west from Pembroke via the settlement of Hundleton towards Angle. Within the built-up area of Pembroke the B4320 is a single carriageway road, subject to a 30 mph speed limit supported by vertical traffic calming features. In addition, street lighting and footpaths are provided on both sides of the road. To the south of the built-up area of Pembroke the speed limit increases to 60 mph until reaching Hundleton Village.

Within the village of Hundleton the B4320 is subject to a 30 mph speed limit, with street lighting and a footway along the northern side of the road. The speed limit reduces further to 20 mph outside the primary school, supported by vertical traffic calming features. The B4320 continues southwest of Hundleton as a single carriageway road subject to the national speed limit.

Approximately 5 km to the west of Hundleton, an unnamed road heads north via a priority junction to Pembroke Power Station. This unnamed road is a single carriageway road subject to the national speed limit and was utilised in the construction of Pembroke Power Station.

7.7.3.2 Freshwater West

The B4320 continues west from the road to Pembroke Power Station towards Angle and a junction with the B4319. The road however, narrows significantly past this point and is predominantly a single lane carriageway with informal passing places.

The B4319 intersects with the B4320 via a priority junction and provides a route south towards the potential Freshwater West export cable landfall location. The B4319 south of the B4320 to Freshwater West is a very narrow single lane carriageway with informal passing places, providing access to the beach and parking areas.

7.7.3.3 Bullslaughter Bay

The B4319 also heads south from Pembroke towards Merrion and Castlemartin. Upon leaving Pembroke the B4319 is a single carriageway road subject to a 40 mph speed limit before increasing to 60 mph. A crawler lane is provided as the B4319 heads out of Pembroke whilst an escape lane is provided for errant vehicles travelling in the opposite direction. The B4319 continues as a single lane carriageway subject to a 60 mph towards Merrion. Access to Bullslaughter Bay would be provided by Ermigate Lane, to the south of Merrion. This is a single lane track, which also serves a part of the ‘Pembrokeshire Coast Path’ Public Right of Way.

7.7.3.4 New Quay

Taking the 60 mph single lane B4319 carriageway subject to a towards Merrion (see Section 7.7.3.3), access to New Quay Beach would proceed down the C3020 single carriageway road, subject to the national speed limit, located at Sampson Cross (approximately 1km south of St Petrox). The C3020 then narrows to a single lane carriageway after 600m. The speed limit reduces to 30mph passing through Bosherton, then returing to national speed limit heading southwards of Bosherton via Buckspool Farm, moving in Castlemartin MoD Firing Range and terminating at St. Govans car park. Access to New Quay would proceed via one of numerous narrow tracks/roads, potentially via the coastal path, with the precise route to be finalised through consultation with MoD if this landfall is chosen.

7.7.3.5 Broad Haven South

Taking the 60 mph single lane B4319 carriageway subject to a towards Merrion (see Section 7.7.3.3), access to Broad Haven South would proceed down the C3020 single carriageway road, subject to the

national speed limit, located at Sampson Cross (approximately 1km south of St Petrox). The C3020 then narrows to a single lane carriageway after 600m. The speed limit reduces to 30mph passing through Bosherton, then returning to national speed limit heading south east towards Broad Haven. The narrow single lane carriageway, with informal passing places, terminates at Brad Haven South beach carpark.

7.7.3.6 Freshwater East

The A4139 proceeds east from Pembroke towards Lamphey, passing through the village with a 30mph speed limit, street lighting, and a footpath on the eastern side of the road. The A4139 then intersects with the B4584 heading to Freshwater East, alternating between single lane carriageway and single carriageway, returning to national speed limit upon leaving Lamphey. The B4584 enters Freshwater East, reducing to 30mph speed limit. At the junction, Trewent Road is followed, a single carriageway towards Freshwater East carpark and access to the dunes and beach.

7.7.3.7 Greenala Point

Continuing on Trewent Road (see Section 7.7.3.6), the single lane carriageway C3020 is followed, turning into Stackpole Road and returning to national speed limit. The single lane carriageway (with informal passing places), passes through East Trewent, remaining at national speed limit. Leaving East Trewent and passing East Trewent Farm, the single carriageway C3020 continues for approximately 1km to the West Trewent junction turning towards Barafundle Barns to the right, and a private track through fields towards Greenala Point to the left.

7.7.4 Potential Impacts

The GEART guidance provides a framework for the assessment of traffic borne environmental impacts, such as pedestrian severance and amenity, driver delay, accidents and safety; and noise, vibration and air quality.

GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%).
- Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

The above criteria applied to the Project's traffic demand will dictate the extent of the Study Area and the scale of the impact assessment.

Traffic demand is currently unknown for both construction and operation phases. This applies to both onshore construction and operation activities but also to the onshore traffic associated with the offshore construction and operation (e.g. people or materials being driven to a port by road to be taken offshore to maintain the project).

It is not known which port would be utilised for the construction and operation of the offshore elements of the Project. It is conceivable that an existing port with appropriate permissions may be utilised, therefore not requiring new permissions or any further assessment. However, if new port permissions are required it is considered that that the daily traffic demand for both the operational and construction phases maybe above GEART thresholds.

On this basis all traffic and transport effects are scoped in with the caveat: Once more detail of the proposed port, and chosen landfall location are identified, further investigations regarding likely traffic will be undertaken and a more detailed transport scoping note would be prepared and submitted to the highway authority to confirm the scope of assessment.

Table 7.13 Summary of Key Sensitivities and Potential Impacts for Traffic and Transport

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase (onshore)			
Road users and local communities	Highway Safety	Yes	At this stage, the extent of traffic demand is undetermined. However, given the remote nature of parts of the study area and relatively low background traffic flows, even modest increases in traffic would likely be above GEART screening thresholds for potential impacts and further assessment will be necessary.
Local communities	Pedestrian Amenity	Yes	
Local communities	Severance	Yes	
Road users and local communities	Driver Delay	Yes	At this stage, the extent of traffic demand is undetermined. Experience of similar projects indicates that the levels of construction traffic would not typically result in significant queuing or delay, but highway stakeholders may require junction capacity modelling to validate this assertion. Furthermore, during the construction phase, the installation of cables within or across the highway could result in delay or diversions associated with temporary traffic management.
Other road users and local communities	Abnormal Loads	Yes	The size of proposed loads that may need to be transport by road is unknown at this stage. However, typically transformers or cable drums for offshore windfarm projects constitute abnormal loads. If abnormal loads are required, an abnormal load report will need to be produced to check the suitability of routes and inform an assessment of potential delays.
Construction Phase (offshore)			
Road users and local communities	Highway Safety	No	At this stage, the extent of traffic demand is undetermined. Experience of similar projects would indicate that construction traffic demand for offshore construction would be minimal as the majority of materials are typically be delivered by sea. Traffic demand numbers will be determined prior to the EIA, and if these are shown to be minimal, following refinement of the project design, it is proposed that offshore construction impacts be scoped out. Alternatively, it is proposed to defer this assessment to a post consent. A Port Traffic Management Plan can
Local communities	Pedestrian Amenity	No	
Local communities	Severance	No	
Road users and local communities	Driver Delay	No	
Other road users and local communities	Abnormal Loads	No	

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
			then be submitted to the relevant regulators for approval once the final port(s) are known
Operational Phase (onshore and offshore)			
Road users and local communities	Highway Safety	No	At this stage, the extent of traffic demand is undetermined. However, experience of similar projects would indicate that operational traffic demand would be minimal. Once numbers are defined, and if they prove to be minimal, in consultation with relevant statutory stakeholders, it is proposed operational impacts be scoped out.
Local communities	Pedestrian Amenity	No	
Local communities	Severance	No	
Road users and local communities	Driver Delay	No	
Other road users and local communities	Abnormal Loads	No	
Decommissioning Phase			
Impacts considered to be similar and no worse than those described for the construction phase.			
Cumulative Impacts are scoped in for this receptor group			

7.7.5 Potential Mitigation

The transportation of materials and work force will be considered during the development of the Project. The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to transport receptors. If it is assessed that there is the potential for significant impacts to arise, mitigation measures could be introduced to reduce the significance of the impact to an acceptable level (however this will be fully investigated during the environmental assessment).

Noting the temporary nature of the potential impacts, the following types of mitigation (if required) would be prioritised over hard engineering solutions (e.g. road widening and new junctions):

- Defining and enforcing delivery routes and avoiding sensitive periods, e.g. school times;
- Investigating the potential to transport construction materials and plant to the construction site by sea rather than road to reduce the effect on the local road network;
- Committing to the development of a Construction Traffic Management Plan to manage deliveries to avoid certain times, or use only defined routes; and
- Committing to repair or make good any damage caused to existing highways due to construction traffic movements.

The above list is not intended to represent an exhaustive list of potential mitigation measures; however, such mitigation measures have potential to effectively manage the risk to transport receptors.

7.7.6 Environmental Assessment Approach

At the time of producing this Scoping Report it is not known which port would be utilised for the construction and operation of the offshore elements of the Project, the landfall location and potential

onshore cable route. Therefore, this Scoping has been undertaken on the basis that construction and operational traffic demand could exceed the GEART screening thresholds. It is proposed to undertake further scoping with the highway authorities regarding the assessment of construction and operational phase impacts once final options have been decided and further detail of the likely traffic demand is available.

It is proposed that further assessment would comprise a desk-based assessment that will present road traffic numbers / main routes within and adjacent to the site. The impact assessment will be based upon a comparison between this data and the expected traffic levels associated with the development through construction, operation and decommissioning.

7.8 Landscape, Seascape and Visual Impacts

This section describes the landscape, seascape and visual baseline environment and potential effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

This is a desktop based assessment; it does not represent a comprehensive Landscape and Visual Impact Assessment (LVIA), and no site visit by a landscape architect has been undertaken. However, it does apply the general principles set out in the publication Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA) (Landscape Institute/IEMA, 2013), and provides a preliminary outline assessment of likely landscape, seascape and visual effects. It also takes into account guidance available from Scottish Natural Heritage (SNH), in particular their publication Visual Representation of Windfarms: Good Practice (SNH, 2017).

This chapter has been produced with reference to the Welsh National Marine Plan (Welsh Government, 2019). Policies in the Welsh National Marine Plan of relevance to landscape, seascape and visual amenity, and which should be taken into account when assessing the PDZ development are:

- Policy SOC_06: Designated Landscapes;
- Policy SOC_07: Seascapes; and
- Policy GOV_01: Cumulative effects.

As well as the above listed policies which aim to protect the landscape, the Welsh National Marine Plan recognises the benefits of marine renewable energy through wind, wave and tidal resources, and supports these through the ‘Energy – Low Carbon’ Sector Policies ELC_01 to ELC_04. Associated subsea cabling objectives are discussed in the ‘Subsea Cabling’ Sector Policy CAB_01.

Pembrokeshire Coast National Park Authority (PCNPA) adopted Local Development Plan 2 in September 2020. Associated Supplementary Planning Guidance (SPG) was also revised, with interim versions of Landscape Character SPG, Seascape Character Assessment SPG, and a final version of Renewable Energy SPG.

Within the PCNPA Local Development Plan 2, Policy 8 Special Qualities and Policy 14 Conservation of the Pembrokeshire Coast National Park relate to safeguarding the character and quality of the National Park. The interim Landscape Character SPG and Seascape Character Assessment SPG provide more detailed guidance on the way in which these Policies are applied.

7.8.1 Data and Information Sources

This desktop study is based upon the following readily available online public data and published documents including published landscape character assessments:

- Pembrokeshire Coast National Park Local Plan (PCNPA, 2020);
- Interim Landscape Character Assessment SPG (PCNPA, 2021);
- Interim Seascape Character Assessment SPG (PCNPA, 2021);
- Renewable Energy SPG (PCNPA, 2021);
- Pembrokeshire Coast National Park Management Plan 2020-2024 (PCNPA, 2019)
- National Seascape Assessment for Wales (NRW, 2015);
- Registered Landscapes of Outstanding or Special Interest (Dyfed Archaeological Trust,
- 2022);

- Interactive Map (MAGIC, 2022); and
- The Pembrokeshire Coast Path (Visit Pembrokeshire, 2018).

7.8.2 Study Area

The study area for effects on landscape, seascape and visual amenity from the offshore platform has been defined as a 15 km offset from the boundary of the PDZ, based on available literature.

The maximum design height of the offshore platform is 45m.. Although the SNH Visual Representation of Windfarms: Good Practice guidance (SNH, 2017) was written for the purpose of assessing windfarms it is considered that, given the vertical structural form of the offshore platform, the SNH guidance can be usefully applied when determining the study area, or likely outer edge of a Zone of Theoretical Visibility (ZTV), for this development proposal. Visual Representation of Windfarms: Good Practice recommends that for wind farms where turbines have a rotor tip of up to 50m, the initial recommended ZTV distance from the outer edge of the wind farm is 15 km.

NRW has produced Guidance Note 46: Using LANDMAP in Landscape and Visual Impact Assessments (GN46) (NRW, 2021), which includes guidance on the typical extent of search and study areas for tall structures. According to GN46, an initial search area for a structure of between 26-49 m in height is 4-8 km. This is the maximum distance up to which moderate (significant) effects can be expected on a high sensitivity receptor within an LVIA, rather than the distance at which a structure is theoretically visible.

A 15 km study area is therefore used for the offshore platform. As it is unknown where within the PDZ the platform will be sited, this study area comprises a 15 km buffer from the perimeter of the PDZ. This is the distance to which the offshore platform is likely to be visible, rather than the distance at which significant effects are expected (the latter are expected to be at much shorter distances).

On-shore grid connections involve burying cables as they reach land; if cliffs are present at the connection point, a hole is drilled from the cliff top for the cable run. An underground connection chamber may be required with a surface level cover. As below-ground / surface level infrastructure, the greatest impact of these elements will be during construction. An above-ground connection chamber and/or sub-station may be required; based on professional experience of other similar projects, the height of these substations will be limited. Therefore, as structures of low vertical elevation, a 2 km study area is used for each potential landfall site for this scoping assessment.

The study area for both the offshore platform and landfall sites should be further refined at the LVIA stage through production of a ZTV; see Section 7.8.6.

7.8.3 Existing Environment

7.8.3.1 Pembrokeshire Coast National Park

All of the potential landfall sites, and the coastline within the study area of the offshore platform, lie within Pembrokeshire Coast National Park. National Parks are designated under the National Parks and Access to the Countryside Act 1949 and the Environment Act 1995, with the dual purpose of conserving and enhancing natural beauty, wildlife and cultural heritage, and promoting understanding and enjoyment of the Special Qualities of National Parks by the public.

The Pembrokeshire Coast National Park Management Plan 2020-2024 (PCNPA) was published in 2019. The PCNPA Management Plan describes the Special Qualities which contribute to the sense of place of

the National Park, and Policies to ensure the National Park is protected and enhanced. Those of relevance to landscape character and visual amenity include:

- Conserving and enhancing the landscapes and seascapes of the National Park;
- Protecting and enhancing dark night skies; and
- Conserve and enhance landscapes of particular historic interest, Conservation Areas, Scheduled Monuments, Listed Buildings and their settings.
-

The PCNPA Management Plan describes the following Special Qualities which contribute to the National Park's sense of place:

- Accessibility and diversity of experiences;
- Islands and coastal splendour;
- Diversity of landscape;
- Distinctive settlement character;
- Rich historic environment and cultural heritage;
- Diverse geology;
- Remoteness, tranquillity, wildness and space to breathe; and
- Richness of habitats and species.

Strategic Policy 8 (Special Qualities) of the PCNPA Local Development Plan 2 protects the Special Qualities of the National Park and states "The special qualities of the Pembrokeshire Coast National Park will be conserved and enhanced."

Policy 14 (Conservation and enhancement of the Pembrokeshire Coast National Park) of the PCNPA Local Development Plan 2 contains policies relating to conservation of the National Park, including that development will not be permitted which causes significant visual intrusion or fails to harmonise with the landscape character of the National Park. The PCNPA will also apply these principles to development which is outside of the National Park but which may have an impact on the Special Qualities of the National Park.

The PCNPA does however recognise the importance of renewable energy in Policy 33 (Renewable and low carbon energy), which states that "There is potential for offshore renewable energy developments which will have landward implications. As an exception to Policy 8a) the National Park Authority accepts that technically feasible routes for onshore connections may not only be available on the developed coast." Offshore renewable energy developments which will have landward implications will be considered, as will onshore connections to off shore renewable energy generators although with the caveat that "Where an undeveloped coastal location is required proposals need to demonstrate why the location is necessary with the least obtrusive approach to design being taken."

7.8.3.2 Scheduled Monuments

There are numerous Scheduled Monuments within the study area; these and other heritage assets are recognised within existing landscape character assessments as key features contributing to landscape character, and within the PCNPA Management Plan 2020-2024 as Special Qualities contributing to Pembrokeshire National Park's sense of place. While Section 7.5 deals with impacts on cultural heritage and heritage assets specifically, this section considers the effects of development on landscape character, and in so doing it recognises the influence of cultural heritage in defining that character. Heritage assets such as Scheduled Monuments may also attract visitors and can therefore be appropriate locations for viewpoints to inform the visual impact assessment.

There are six Scheduled Monuments on the south Pembrokeshire Coast within the 15km study area of the offshore platform; and a total of 16 Scheduled Monuments within the study areas of the six potential landfall sites. The closest of these to any landfall site is Trevallen Downs Tank Range which is approximately 150 m south of New Quay Beach landfall site and is situated on high ground overlooking the beach. There are no other Scheduled Monuments within 500 m of any landfall sites.

7.8.3.3 Conservation Areas

There are no landfall sites within Conservation Areas. There is one Conservation Area within the study area: Portclew Conservation Area is approximately 800 m north-west of Freshwater East landfall site. The settlement of Freshwater East lies in-between and it is therefore unlikely that there will be views of this landfall site from Portclew Conservation Area.

7.8.3.4 Heritage Coast

All landfall sites and their study areas, and the coastline within the study area of the offshore platform, fall within the South Pembrokeshire Heritage Coast, and are therefore protected through local planning policy This is a non-statutory designation but highlights the value of the coast for its exceptional scenic quality, largely undeveloped land and features of interest.

7.8.3.5 Landscape and Seascape Character Assessments

There are a number of existing landscape and seascape / marine character assessments of the Pembrokeshire coast. These are referred to in more detail below but, in summary, they highlight:

- Steep cliffs with open views across the sea from clifftops;
- High quality coastline with heritage features, footpaths and beaches is a visitor attraction;
- Exposed, open grassland landscape with few settlements;
- Castlemartin firing range disturbs tranquillity when in use; and
- Use of coastal waters by boats.

NRW assesses Marine Character Areas (MCAs) in their publication National Seascape Assessment for Wales (LUC, 2015). The PDZ and all landfall sites and/or their study areas fall within the following three MCAs: MCA 22 South Pembrokeshire and Coastal Inshore Waters; MCA 23 South Pembrokeshire Open Waters; and MCA 21 Milford Haven.

MCA 22 South Pembrokeshire and Coastal Inshore Waters lies along the south coast of Pembrokeshire from Milford Haven to Old Castle Head; landfall options Freshwater West and Bullslaughter Bay, Broad Haven South, New Quay Beach, Greenala Point, and Freshwater East fall within this MCA:

"Diverse, rugged coast… Offshore waters are used by ferries, commercial shipping and fishing boats… Popular with walkers … Popular with climbers and kayakers… Wide, unspoilt views out to sea and along the coastline, including views to Caldey Island, as well as Lundy Island and the North Devon coast… Very tranquil, remote and often wild coastline when the firing ranges are not operating... Long stretches of coastline have little or no settlement… Offshore open sea area with simple, consistent and unified marine character at a vast scale and a significant sense of openness, remoteness and exposure."

MCA 23 South Pembrokeshire Open Waters lies to the south of MCA 22 and contains the offshore PDZ area:

"Inter-visibility with the southern Pembrokeshire coastline to the north and east, with the MCA itself forming the setting to views from the Pembrokeshire Coast Path… Busy sea route… Open sea area with a simple, consistent and unified marine character at a vast scale and a significant sense of openness, remoteness and exposure."

MCA 21 Milford Haven comprises the Milford Haven estuary which lies within 1km of the Freshwater West landfall:

"Major deep sea port, Pembroke Port and Milford Docks, with extensive industrial facilities… High numbers of walkers use the coastal path… Busy ports and commercial shipping channels… The oil refinery and associated infrastructure dominates views."

PCNPA have produced an interim version of their Seascape Character Assessment following adoption of the Local Development Plan 2 in 2020, which describes more localised seascape character types than NRW's MCAs. Numerous Seascape Character Areas (SCAs) from this assessment fall within the study area of the PDZ and potential landfall sites:

- SCA 29 Southern inshore waters (contains the PDZ)
- SCA 30 Southern offshore waters (within the study area of the PDZ)
- SCA 34 Freshwater West (contains Freshwater West landfall site)
- SCA 35 Castlemartin coastal waters (contains Bullslaughter Bay landfall site; within the study area of New Quay Beach landfall site; within the study area of the PDZ)
- SCA 36 Stackpole coastal waters (contains New Quay Beach and Broad Haven South landfall sites; within the study area of the PDZ)
- SCA 37 Freshwater East and Manorbier (contains Greenala Point and Freshwater East landfall site).

PCNPA have produced an interim version of their Landscape Character Assessment following adoption of the Local Development Plan 2 in 2020. Numerous Landscape Character Areas (LCAs) from this assessment fall within the study area of the PDZ and potential landfall sites:

- LCA 4 Manorbier/Freshwater East (contains Freshwater East and Greenala Point landfall sites; within study area of Broad Haven South landfall site)
- LCA 5 Stackpole (contains Broad Haven South landfall site; within study area of New Quay Beach landfall site)
- LCA 6 Castlemartin/Merrion Ranges (contains New Quay Beach and Bullslaughter Bay landfall sites; within study area of Broad Haven South and Freshwater West landfall sites; within study area of PDZ)
- LCA 7 Angle Peninsula (within study area of Freshwater West landfall site)
- LCA 8 Freshwater West/Brownslade Burrows (contains Freshwater West landfall site).

LCA 6 Castlemartin/Merrion Ranges, along the south coast from Freshwater Bay south to Stackpole Warren, is the closest to the PDZ and contains landfall sites New Quay Beach and Bullslaughter Bay. The assessment for LCA 6 highlights the importance of coastal views:
"There are extensive views of the open sea from much of the higher ground and along the coast from the coastal path…"

7.8.3.6 LANDMAP

The offshore structure is located approximately 15 km off the coast and is therefore not within the area mapped by LANDMAP; however, it could theoretically be visible from the mapped areas. The six potential onshore connections will fall within areas mapped by LANDMAP. GN46 (NRW) advises that at the scoping or 'search area' stage, a filtering exercise should be undertaken to identify the aspect areas which should be taken forward to assessment at the LVIA stage. This identification exercise should include all aspect areas overlapping with the works; aspect areas adjacent to those overlapping the works and which have a special relationship with those overlapping the works; and aspect areas from which the development is visible and which are evaluated as high or outstanding quality. For the latter, in the absence of a ZTV, a 15km buffer from the PDZ is assumed as the areas from which the offshore platform will be theoretically visible, in line with SNH guidance.

The Visual and Sensory areas which meet the above criteria are:

- St Govan's Head (overlaps potential landfall sites Bullslaughter Bay, New Quay Beach, and Greenala Point; theoretically visible from offshore platform development and evaluated as outstanding)
- Merrion Ranges (theoretically visible from offshore platform development)
- Stackpole Warren (overlaps potential landfall site Broad Haven South; theoretically visible from offshore platform development and evaluated as high)
- Freshwater East (overlaps potential landfall site Freshwater East)
- Frainslake Sands (overlaps potential landfall site Freshwater West).

The Geological Landscape areas which meet the above criteria are:

- St. Govan's head - Linney Head coast (overlaps potential landfall sites New Quay Beach and Bullslaughter Bay; theoretically visible from offshore platform development and evaluated as outstanding)
- Merrion – Bosherston (adjacent to and has a special or functional link with St. Govan"s head - Linney Head coast; theoretically visible from offshore platform development and evaluated as high)
- Stackpole Warren (overlaps potential landfall site Broad Haven South)
- Manorbier – Stackpole Coast (overlaps potential landfall sites Greenala Point and Freshwater East)
- Broomhill – Brownslade Burrows (overlaps potential landfall site Freshwater West; theoretically visible from offshore platform development and evaluated as high/outstanding).

The Landscape Habitats areas which meet the above criteria are:

- Freshwater West - St. Govan's Head (overlaps potential landfall site Bullslaughter Bay; theoretically visible from offshore platform development and evaluated as high/outstanding)
- Bluck's Pool – Broad Haven (adjacent to and has a special or functional link with adjacent coastal areas; theoretically visible from offshore platform development and evaluated as high/outstanding)
- St. Govan's Head – Giltar Point (overlaps potential landfall site Newquay Beach and Greenala Point; adjacent to and has a special or functional link with adjacent coastal areas; theoretically visible from offshore platform development and evaluated as outstanding)
- Broad Haven - Lydstep Haven (overlaps potential landfall sites Broad Haven South, Greenala Point and Freshwater East; adjacent to and has a special or functional link with adjacent coastal areas)
- Stackpole Warren (overlaps potential landfall sites Broad Haven South, Greenala Point and Freshwater East; adjacent to and has a special or functional link with adjacent coastal areas)
- Freshwater East Dunes (overlaps potential landfall site Freshwater East; adjacent to and has a special or functional link with adjacent coastal areas)

- Barafundle Bay -Manorbier Camp (adjacent to and has a special or functional link with adjacent coastal areas at Greenala Point and Freshwater East)
- Freshwater West (overlaps potential landfall site Freshwater West)
- Brownslade Burrows (adjacent to and has a special or functional link with adjacent coastal areas at Freshwater West)
- Broomhill Burrows (adjacent to and has a special or functional link with adjacent coastal areas at Freshwater West)
- West Angle Bay - Freshwater West (UID PMBRKLH376) (adjacent to and has a special or functional link with adjacent coastal areas at Freshwater West)
- West Angle Bay - Freshwater West (UID PMBRKLH874) (adjacent to and has a special or functional link with adjacent coastal areas at Freshwater West).

The Historic Landscape areas which meet the above criteria are:

- Broad Haven to Stack Rocks coast (overlaps potential landfall sites Bullslaughter Bay and New Quay Beach; theoretically visible from offshore platform development and evaluated as outstanding)
- Castlemartin Range East (adjacent to and has a special or functional link with Broad Haven to Stack Rocks coast)
- Stackpole Warren (overlaps potential landfall site Broad Haven South)
- Stackpole to Freshwater East Coast (overlaps potential landfall site Greenala Point)
- Freshwater East (overlaps potential landfall site Freshwater East)
- Kilpaison and Brownslade Burrows (overlaps potential landfall site Freshwater West).

The Cultural Landscape areas which meet the above criteria are:

- St Govan's Head (overlaps potential landfall sites Bullslaughter Bay, New Quay Beach, and Greenala Point; theoretically visible from offshore platform development)
- Merrion Ranges (theoretically visible from offshore platform development)
- Stackpole Warren (overlaps potential landfall site Broad Haven South; theoretically visible from offshore platform development)
- Freshwater East (overlaps potential landfall site Freshwater East)
- Frainslake Sands (overlaps potential landfall site Freshwater West).

7.8.3.7 Registered Landscapes of Outstanding Special Interest

Broad Haven South landfall site lies within a Registered Landscape of Outstanding Special Interest. In addition, Registered Landscapes of Outstanding Special Interest lie within the study areas of New Quay Beach, Freshwater West and Freshwater East landfall sites:

- Freshwater West landfall site lies approximately 1km south of Historic Landscape Area: Milford Haven Waterway. This Historic Landscape Area is split into further smaller areas, of which the closest to Freshwater West onshore connection site are ‘West Angle to Freshwater West Coastal Strip’ and ‘Rhoscrowther’. West Angle to Freshwater West Coastal Strip comprises a narrow band of moor, scrub and rough ground with often no connection to its agricultural hinterland and containing many military buildings of historical significance. Rhoscrowther is described as agricultural land with a regular field pattern bounded by hedge banks and occasional drystone walls, and dispersed settlements.
- Broad Haven South landfall site is in Historic Landscape Area: Stackpole Warren, a well-defined but small historic landscape area. The land was pre-historically agricultural land with small settlements, until sand build-up made it unsuitable for farming. It is now characterised by limestone cliffs and unenclosed pasture with bracken, woodland and sandy patches.
- Greenala Point is approximately 1km northeast of Stackpole Warren Historic Landscape Area.

- New Quay Beach landfall site is approximately 800 m south of Stackpole Warren Historic Landscape Area.
- Freshwater East landfall site lies approximately 1km south-west of Manorbier Historic Landscape Area, and more specifically the Freshwater East to Lydstep Coastal Strip area. The character of the coastal strip consists of high exposed cliffs with narrow sandy bays, bounded by the sea to the south and farmland to the north. There are numerous sites of heritage importance along the coast including from prehistoric to 20th century military.

7.8.3.8 Registered Parks and Gardens

Approximately 500m to the north-west of Broad Haven South landfall site is Stackpole Court Historic Park and Garden. Stackpole Court contains a series of valleys which were dammed to create long, narrow artificial lakes or lilyponds, the longest of which is 2km long, with deciduous woodland on the valley slopes. There are publicly accessible walking trails around the lilyponds, including walkways and bridges across the ponds, and along the higher ridge lines surrounding the valleys. Views out are limited by vegetation and landform. Stackpole Court mansion was demolished in the 1960s but the ornamental gardens and pleasure grounds remain including a walled garden, summerhouses and grottos. Remaining buildings include a gardener's cottage, stable block, brewery, gasworks, game larder, dairy house, icehouse and Georgian farmhouse; many of these buildings and structures are listed. Approximately 50% of this Registered Park and Garden (the southern half) falls within the 2km study area for Broad Haven South. Approximately 30% falls within the study area for New Quay Beach.

7.8.3.9 Visual Baseline

There is network of Public Rights of Way (PRoWs) in the Study Area and the Pembrokeshire Coast Path national trail (part of the Wales Coast Path) follows much of the mainland Pembrokeshire coastline, although it is diverted away from the coast at the Castlemartin firing range. Users of these routes, as well as visitors to beaches and a number of attractions along the Pembrokeshire Coast, will have long range views south out to sea in the direction of the PDZ. Due to the open character of the landscape as identified in the landscape character assessments above, they are also likely to have views (albeit shorter ranged) of any land based development including substations and onshore cable routes. The presence of the national trail and National Park indicate that this landscape is highly valuable for its scenic quality, including visual amenity. Scheduled Monuments, Listed Buildings and Registered Parks and Gardens may also attract visitors, whose views could be affected by the proposals.

It should be noted that the Castlemartin firing range restricts visitor numbers to the south Pembrokeshire Coast. The Pembrokeshire Coast Path and some PRoWs pass through the firing range; these routes are at times closed to the public in which case alternative routes are to the north of the firing range, away from the coast.

7.8.4 Potential Impacts

A summary of potential impacts on Landscape, Seascape and Visual Impacts is set out in Table 7.14.

Table 7.14 Summary of Key Sensitivities and Potential Impacts for Landscape and Seascape Character

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Landscape character of the Pembrokeshire Coast National Park and the Special Qualities for which it was designated	It is anticipated that construction activities associated with the offshore platform could be seen from within the National Park. For all six landfall options being considered, they and associated substations and onshore cable routes would fall within the National Park.	Yes (All landfall options)	The National Park is a highly sensitive receptor. Open sea views are noted as a key characteristic in existing character assessments which could be disrupted by views of construction activities associated with the offshore platform. Although onshore cables are to be buried when passing through the National Park, cable laying will have an impact during construction and features which cannot be readily replaced may require removal to enable construction. Construction of substations, if required, would be new features in the landscape.
Character of Registered Landscapes of Outstanding or Special Interest: Milford Haven Waterway; Stackpole Warren; and Manorbier	Registered Landscapes of Outstanding Special Interest are within the study areas of Broad Haven South, New Quay Beach, Freshwater West and Freshwater East.	Yes (Broad Haven South, New Quay Beach, Greenala Point, Freshwater West and Freshwater East)	Cable laying will have an impact during construction, and substations if required would be new features in the landscape.
MCAs 21-23 of the National Seascape Assessment for Wales (NRW)	The offshore platform will be located within MCA 23. Other MCAs are in the study area of the offshore platform and landfall sites.	Yes (Offshore platform only)	Construction activities associated with the offshore platform would be new features within an open seascape.
SCAs 29-30 and 34-37 of PCNPA Seascape Character Assessment	The offshore platform will be located within SCA 29. Other SCAs are in the study area of the offshore platform and landfall sites.	Yes (Offshore platform only)	Construction activities associated with the offshore platform would be new features within an open seascape.
LCAs 4-8 of the PCNPA Landscape Character Assessment	Onshore landfall sites and associated substations and cable routes fall within these LCAs and there may be views of construction activities associated with the offshore structure.	Yes (All landfall options)	Open sea views are noted as a key characteristic in existing character assessments, which could be disrupted by views of construction of the offshore platform. Cable laying will have an impact during construction, and substations if required would be new features in the landscape.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Character of LANDMAP aspect areas	Onshore landfall sites and associated substations and cable routes fall within these aspect areas and there may be views of construction activities associated with the offshore structure.	Yes (All landfall options)	Open sea views could be disrupted by construction of the offshore platform. Cable laying will have an impact during construction, and substations if required would be new features in the landscape. Many aspect areas are evaluated as high or outstanding.
Character of Portclew Conservation Area	Portclew Conservation Area is within the study area of Freshwater East landfall site	Yes (Freshwater East)	The Conservation Area is 800m from Freshwater East landfall site and intervening settlement restricts views, however onshore cable routes are currently unknown and could pass through or close to the Conservation Area.
Character of South Pembrokeshire Heritage Coast	Onshore landfall sites fall within the Heritage Coast and there may be views of construction activities associated with the offshore structure.	Yes (All landfall options)	Open sea views could be disrupted by construction of the offshore platform and cable laying. Construction of substations, if required, could disrupt the scenic quality of the coastline.
Character of Stackpole Court Historic Park and Garden	Stackpole Court is within the study area of Broad Haven South landfall site	Yes (Broad Haven South)	Stackpole Court is 500 m from Broad Haven South landfall site with intervening landform and woodland restricting views, however onshore cable routes are currently unknown and could pass through or close to the Historic Park and Garden.
Operation Phase			
Landscape character of the Pembrokeshire Coast National Park and the Special Qualities for which it was designated	It is anticipated that the offshore platform could be seen from within the National Park. For all six landfall options being considered, they and associated substations and onshore cable routes would fall within the National Park.	Yes (All landfall options)	Open sea views are noted as a key characteristic in existing character assessments which could be disrupted by views of the offshore platform. Although onshore cables are to be buried when passing through the National Park, features which cannot be readily replaced may require removal to enable cable laying and will remain an impact during operation.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Character of Registered Landscapes of Outstanding or Special Interest: Milford Haven Waterway; Stackpole Warren; and Manorbier	Registered Landscapes of Outstanding Special Interest are within the study areas of Broad Haven South, New Quay Beach, Freshwater West and Freshwater East.	Yes (Broad Haven South, New Quay Beach, Greenala Point, Freshwater West and Freshwater East)	Features which cannot be readily replaced may require removal to enable cable laying and will remain an impact during operation. Substations, if required, would be new features in the landscape.
MCAs 21-23 of the National Seascape Assessment for Wales (NRW)	The offshore platform will be located within MCA 23. Other MCAs are in the study area of the offshore platform and landfall sites.	Yes (Offshore platform only)	The offshore platform would be a new feature within an open seascape.
SCAs 29-30 and 34-37 of PCNPA Seascape Character Assessment	The offshore platform will be located within SCA 29. Other SCAs are in the study area of the offshore platform and landfall sites.	Yes (Offshore platform only)	The offshore platform would be a new feature within an open seascape.
LCAs 4-8 of the PCNPA Landscape Character Assessment	Onshore landfall sites and associated substations and cable routes fall within these LCAs and there may be views of the offshore structure.	Yes (All landfall options)	Open sea views are noted as a key characteristic in existing character assessments, which could be disrupted by views of the offshore platform. Substations, if required, would be new features in the landscape.
Character of LANDMAP aspect areas	Onshore landfall sites and associated substations and cable routes fall within these aspect areas and there may be views of the offshore structure.	Yes (All landfall options)	Open sea views could be disrupted by the offshore platform. Substations, if required, would be new features in the landscape. Many aspect areas are evaluated as high or outstanding.
Character of Portclew Conservation Area	Portclew Conservation Area is within the study area of Freshwater East landfall site	No	The Conservation Area is 800 m from Freshwater East landfall site and intervening settlement restricts views.
Character of South Pembrokeshire Heritage Coast	Onshore landfall sites fall within the Heritage Coast and there may be views of the offshore structure.	Yes (All landfall options)	Substations, if required, could disrupt the scenic quality of the coastline. Open sea views could be disrupted by the offshore platform.
Character of Stackpole Court Historic Park and Garden	Stackpole Court is within the study area of Broad Haven South landfall site	No	Stackpole Court is 500 m from Broad Haven South landfall site with intervening landform and woodland restricting views.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Decommissioning Phase			
Receptors are likely to be similar to construction. The baseline conditions and receptors may change over time.	Impacts are likely to be similar to construction.	Yes	As construction.

Table 7.15 Summary of Key Sensitivities and Potential Impacts for Visual Amenity

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Visitors to Pembrokeshire Coast National Park including users of the Pembrokeshire Coast Path and other PRoWs	Views of construction activities associated with the offshore platform, onshore landfall sites and associated substations and cable routes.	Yes (All landfall options)	Users of PRoWs are highly sensitive receptors as they are engaged in an activity of which visual amenity is a key part. Users of PRoWs within the National Park are of particularly high sensitivity.
Visitors to heritage assets, beaches and other outdoor recreational activities on the Pembrokeshire Coast including coastal sports such as kayaking/surfing.	Views of construction activities associated with the offshore platform, onshore landfall sites and associated substations and cable routes.	Yes (All landfall options)	These receptors are likely to be of high to moderate sensitivity, depending on whether their activity is based on an enjoyment of their surrounding landscape.
Local residents within Pembrokeshire	Views of construction activities associated with the offshore platform, onshore landfall sites and associated substations and cable routes.	Yes (All landfall options)	Residents are considered highly sensitive receptors. Further assessment will be required to establish the magnitude of effect to local residents. LVIA is primarily concerned with views from public viewpoints, therefore residents will be grouped into 'receptor groups'; properties will not be assessed on an individual basis.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Passengers on boats	Views of construction activities associated with the offshore structures.	Yes (All landfall options)	Passengers on boats will have a moderate sensitivity to the development as enjoyment of views will in many cases not be the primary purpose of their activity. However due to their proximity to the offshore platform they may experience a significant change to views.
Users of Castlemartin firing range	Views of construction activities associated with the offshore structures, and onshore landfall sites and associated substations and cable routes.	No	These users will not be engaged in an activity of which the primary purpose is enjoyment of views therefore are not considered to be a sensitive receptor.
Operation Phase			
Visitors to Pembrokeshire Coast National Park including users of the Pembrokeshire Coast Path and other PRoWs	Views of offshore platform, onshore landfall sites and associated substations, and disturbance caused by laying cables.	Yes (All landfall options)	As construction.
Visitors to heritage assets, beaches and other outdoor recreational activities on the Pembrokeshire Coast including coastal sports such as kayaking/surfing.	Views of offshore platform, onshore landfall sites and associated substations and disturbance caused by laying cables.	Yes (All landfall options)	As construction.
Local residents within Pembrokeshire	Views of offshore platform, onshore landfall sites and associated substations and disturbance caused by laying cables.	Yes (All landfall options)	As construction.
Passengers on boats	Views of offshore structures.	Yes (All landfall options)	As construction.
Users of Castlemartin firing range	Views of offshore structures, and onshore landfall sites and associated substations and disturbance caused by laying cables.	No	As construction.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Decommissioning Phase			
Receptors are likely to be similar to construction. The baseline conditions and receptors may change over time.	Impacts are likely to be similar to construction.	Yes	As construction.

The PDZ is leased for a period of 45 years and during this time the built structures within it could change; e.g. new offshore platforms could be added or replaced with larger structures as technology develops. This would provide changing views which is likely to have a greater impact on visual amenity than if views remained static for the 45 year period. Other projects built within the PDZ would be subject to their own LVIA. Boat traffic to construct, maintain and decommission structures within the PDZ and to lay offshore cables will be required, though as this area of coast already experiences frequent boat traffic this would not be a new feature within views. Offshore/onshore cable routes, landfall options and substations are not likely to change during the 45 year period.

7.8.5 Potential Mitigation

The potential mitigation proposed for the Project is as follows:

- The position of offshore structures within the PDZ; siting of the structure further from land will reduce visual impact;
- Consideration of detailed design and colours for the offshore platform;
- Choosing a landfall site which would provide the shortest onshore cable route and avoid substations and cable routes within or near sensitive receptors;
- Sensitive siting, design and potential screening of substations; and
- Using underground cables and restricting these to highways/footways to minimise disturbance to landscape character and visual amenity; and
- Sensitive design of any required lighting.

7.8.6 Environmental Assessment Approach

It is considered that there is potential for significant effects on landscape / seascape character and visual amenity as a result of these works and therefore a full LVIA will be required in line with GLVIA.

The assessment of effects on landscape / seascape character will involve an analysis of existing character assessments as well as a site visit by a landscape architect to confirm the validity of these assessments and identify the character areas which may be affected. The assessment should take into account the impact of any required lighting on the character of the National Park in line with PCNPA Management Plan Policy L2: Protect and enhance dark night skies.

The assessment of effects on visual amenity will first involve the production of a ZTV to refine the Study Area; this should be produced digitally, taking into account ground levels, buildings, vegetation cover and earth curvature, and will indicate the areas from which the development could theoretically be visible. A site visit by a landscape architect will be conducted to assess key viewpoints from within the ZTV, and to produce a photographic record of the baseline site conditions. It is important to agree the location of key viewpoints

in advance with PCNPA. Landscape Institute Technical Guidance Note 06/19 Visual Representation of Development Proposals should be followed when taking photographs and presenting images.

For selected key views towards the offshore platform, verified photomontages should be produced in order to give an accurate visual representation of the scale and nature of appearance of the structure. The locations of these should be agreed in advance with PCNPA.

7.9 Underwater Noise and Vibration

This section describes the approach to assessing the potential noise-induced effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

Given that percussive piling is under consideration as a method for installing foundations for the PDZ MOS platform in the updated project design, it is appropriate to consider the latest guidance on noise impacts on marine mammals, fish and turtles. To this end the following guidance on noise impact thresholds will be considered in the EIA:

- Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. Aquatic Mammals, 45(2), pp.125-232.
- Popper AN, Hawkins AD, Fay RR, Mann D, Bartol S, Carlson T, Coombs S, Ellison WT, Gentry R, Halvorsen MB, Løkkeborg S, Rogers P, Southall BL, Zeddies D and Tavolga WN (2014). Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report, ASA S3/SC1.4 TR-2014 prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Springer and ASA Press, Cham, Switzerland.

In addition, the latest scientific literature will be reviewed in the EIA to inform the impact assessment of other receptors such as shellfish.

7.9.1 Data and Information Sources

This chapter is informed by the Project Design (Section 2) and Sections 6.3 and 6.4.

It will be necessary for underwater noise modelling (piling noise, vessel noise and UXO clearance) to be undertaken to inform the assessment of the potential effects of underwater noise and vibration.

7.9.2 Study Area

The Study Area for the assessment covers the offshore Project Area, as presented in Figure 2.1. A number of different options exist for the location of the export cable route and at this stage the route has not been selected. Therefore, for the purposes of this Scoping Opinion the area encompassing all possible cable route areas and the PDZ has been considered.

7.9.3 Existing Environment

To identify noise sensitive receptors and noise sources present within the Study Area, this section has utilised information from:

- Chapter 2 (Project Description); and
- Chapter 6.3 (Fish and Shellfish Ecology);
- Chapter 6.4 (Marine Mammal and Reptile Ecology)

7.9.4 Potential Impacts

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Fish and Shellfish; Marine Mammals	Physical injury and disturbance	Yes (Mortality, physical injury and disturbance)	The consideration of piling as a possible construction method in the Project Design leads to the additional risks of mortality and physical injury. The ranges of these impacts will be dependent on the specific parameters of the piling method chosen, such as total number of piles, hammer energy, pile diameter, pile length and the surrounding geophysical environment. These factors will be included in a noise modelling study
Operational Phase			
Operational impacts are anticipated to be of lower magnitude than construction.			
Decommissioning Phase			
Decommissioning impacts are anticipated to be of lower magnitude than construction.			
Cumulative Impacts are scoped in for this receptor group			

7.9.5 Potential Mitigation

Noise mitigation specific to each ecological receptor group is detailed in their respective chapter.

7.9.6 Environmental Assessment Approach

It is proposed that due to the limited Project Design scope of a single MOS platform in the operational phase, the concern regarding operational noise impacts is sufficiently low that a site-specific survey of baseline levels of sound in the study area is not required.

However, there is potential for noise impacts during the construction phase, due to the potential use of piling of the MOS platform foundations. For this reason, a site-specific underwater noise modelling study will be required to inform the EIA. The source level and propagation modelling will be based on realistic worst-case scenarios for parameters such as pile-diameter, piling duration, and hammer energy. It is proposed that marine mammals and pelagic fish will be assumed to flee from the noise source, whilst demersal fish, shellfish, eggs, and larvae will be conservatively treated as stationary receptors in the noise impact modelling. The outputs of this modelling will be combined with data on marine mammal, fish, shellfish and turtle distribution to reach conclusions on likely effect ranges and number of individuals affected.

This approach will be taken forward in consultation and agreement with regulators.

7.10 Onshore Noise and Vibration

This section describes the onshore noise and vibration baseline environment and potential effects associated with the construction, operation and decommissioning of the Project.

The approach to scoping was carried out in accordance with the following guidance documents:

An updated version of British Standard (BS) 4142 was published in 2019, the current version is BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. Additional guidance documents which may also be considered relevant are:

- British Standard (BS) 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound;
- British Standard (BS) 5228: Code of practice for noise and vibration control on construction and open sites;
- British Standard (BS) 8233: Guidance on sound insulation and noise reduction for buildings;
- Design Manual for Roads and Bridges, LA111 Noise and Vibration, Revision 2;
- WHO (2009) Night Noise Guidelines for Europe; and
- World Health Organization (WHO) Guidelines for Community Noise.

7.10.1 Study Area

The Study Area for the assessment covers the Project Area and is presented in Figure 2.1. A number of different options exist for the location of the onshore cable route and at this stage this has not been selected. Therefore, for the purposes of this Scoping Opinion the area encompassing all possible landfall, substation and associated onshore cable route areas has been considered. This also includes the construction and operational transport routes.

7.10.2 Data and Information Sources

This desktop-based assessment has utilised Google Maps Aerial Photography to identify noise sensitive receptors and noise sources present within the Study Area.

7.10.3 Existing Environment

The landfall options currently being considered (see Section 2.3.5) are predominantly rural areas with some nearby small villages and isolated residential properties which are likely to already experience low ambient noise levels, with the exception of those located near to the Castlemartin Firing Range. The main noise sources in these areas are likely to be local roads and birdsong.

The exact location of onshore cable corridor is not known at this stage however it is likely that it will pass though areas predominantly rural in nature to get to Pembroke Power Station where the grid connection point is located. An industrial estate is situated approximately 1 km to the west of Pembroke Power Station.

7.10.4 Potential Impacts

The scope of noise and vibration impacts encompasses airborne noise and vibration and ground-borne vibration. In accordance with current best practice for EIA, ecological/ biodiversity receptors are scoped out of the noise and vibration assessment. Potential noise and vibration impacts on these receptors will be considered by the relevant species specialists if necessary.

During operation, transformers and other wound power equipment, which may be located at the proposed onshore grid connection, vibrate at twice the power frequency i.e. 100Hz and associated harmonic frequencies e.g. 200Hz, 300Hz. However, the transmission of vibration into the ground is prevented using industry standard mitigation techniques such as vibration isolation pads. Embedded mitigation in the form of anti-vibration mounts will be used at the operational substation, hence any ground-borne vibration transmitted from the site will be negligible. Hence, operational vibration is proposed to be scoped out of the EIA.

Table 7.16 Summary of Key Sensitivities and Potential Impacts for Onshore Noise and Vibration

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Ecological receptors	Disturbance to behaviour patterns during construction phase.	No	Impacts will be assessed in the ecological/biodiversity impact assessment
Human receptors	Temporary increases in noise and vibration levels leading to annoyance and/or adverse health effects	Yes	There is the potential for these impacts to occur during construction of the onshore Project elements
Buildings	Temporary increases in ground-borne vibration leading to building damage	Yes	There is the potential for these impacts to occur during construction of the onshore Project elements
Operational Phase			
Ecological receptors	Disturbance to behaviour patterns during operational phase.	No	Impacts will be assessed in the ecological/biodiversity impact assessment
Human receptors	Permanent increases in noise levels leading to annoyance and/or adverse health effects	Yes	There is the potential for these impacts to occur during operation of the onshore Project substation
Human receptors	Permanent increases in vibration levels leading to annoyance and/or adverse health effects	No	Embedded mitigation will ensure vibration emitted by the onshore grid connection will be negligible
Decommissioning Phase			
Ecological receptors	Disturbance to behaviour patterns during construction phase.	No	Impacts will be assessed in the ecological/biodiversity impact assessment
Human receptors	Temporary increases in noise and vibration levels leading to annoyance and/or adverse health effects	Yes	There is the potential for these impacts to occur during decommissioning of the onshore Project elements

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Buildings	Temporary increases in ground-borne vibration leading to building damage	Yes	There is the potential for these impacts to occur during decommissioning of the onshore Project elements
Cumulative Impacts are scoped in for this receptor group			

7.10.5 Potential Mitigation

The potential mitigation proposed for onshore noise and vibration as follows:

- Siting / orientation of the substation to avoid sensitive receptors;
- Selection of quieter equipment;
- Installation of acoustic enclosures / barriers;
- Installation of acoustic barriers; and
- Silencing of exhausts/outlets for air handling/cooling units.

7.10.6 Environmental Assessment Approach

Following refinement of the onshore export cable corridor route, the Local Authority planning portal will be consulted to identify any consented new sensitive receptors (e.g. residential development) in the locality which are not yet constructed.

Noise and vibration issues associated with the onshore elements of the Project construction phase including cable installation, substation and access roads construction would be assessed according to the guidance contained in BS 5228:2009+A1:2014, which defines the accepted prediction methods and source data for various construction plant and activities.

A desk-based assessment will be undertaken to determine the likely human impacts due of noise emissions on identified sensitive receptors. Dependent on the outcomes of this assessment, if the Project is likely to generate noise or vibrations that will be detectable onshore and there are sensitive receptors close by, a baseline survey would be required in order to assess the normal background levels associated at the site, particularly at locations that are likely to be most sensitive. This may apply to the offshore or onshore elements of the Project.

7.11 Air Quality

This section describes the onshore air quality baseline environment and potential effects associated with the construction, operation and decommissioning of the Project.

The study is desktop based and uses monitored pollution data collected by Pembrokeshire County Council and background pollution predictions provided by Defra.

The following air quality guidance documents were considered in the production of this chapter:

- IAQM (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites
- Natural England (2018) Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations
- Joint Nature Conservation Committee (JNCC) (2021) Guidance on Decision-making Thresholds for Air Pollution

7.11.1 Data and Information Sources

This scoping report has used 2015-2019 air quality monitoring data from Pembrokeshire County Council and mapped background pollutant concentrations for 2018 from Defra to establish baseline air quality conditions.

7.11.2 Study Area

At this stage of the project, the export cable route has not yet been finalised, and therefore for the purposes of the Project Scoping the Study Area encompasses the Project Area, as shown in Figure 2.1.

7.11.3 Existing Environment

7.11.3.1 Local Air Quality Management

Pembrokeshire County Council has declared statutory Air Quality Management Areas (AQMAs) in Haverfordwest and Pembroke for exceedances of the annual mean nitrogen dioxide (NO2) objective. The Haverford-west AQMA is located approximately 10 km north of the Study Area, and is therefore not anticipated to be affected by the development. The Pembroke AQMA is within the Study Area.

7.11.3.2 Air Quality Monitoring

The latest air quality Annual Status Report published by Pembrokeshire County Council for 2020 (Pembrokeshire County Council, 2020) was reviewed to provide air quality monitoring data within the Pembroke area. These monitored concentrations from 2015-2019 are presented in Table 7.17.

Table 7.17 Latest Pembroke Air Quality Monitoring Data 2015-2019

Tube ID	Within Air Quality Management Area?	Annual Mean NO_2 Concentration (µg m^{-3})				
		2015	2016	2017	2018	2019
PCC40	Yes	20.2	20.1	20.5	20.7	21
PCC41	Yes	22.7	23.4	23.8	24.4	24.5
PCC42	Yes	23	20.6	19.4	19.7	22.1
PCC43	Yes	29.3	31.5	31.9	31.7	32.5
PCC44	Yes	33.7	33.7	33.3	36.4	35.4
PCC45	Yes	37.3	**40.5**	38.2	**41.2**	39.3
PCC46	Yes	30.5	33.5	33.1	35.5	34.3
PCC47	Yes	22.4	24.3	24.8	23.6	23.9
PCC48	Yes	13	13	12.5	12.1	12.6

As shown in Table 7.17, concentrations in Pembroke were below the annual mean NO_2 Objective of 40 µg m^{-3} at all locations in 2019; however, concentrations were elevated and have exceeded the Objective in two recent years at locations PCC45. This location is within the AQMA, and located immediately adjacent to the roadside along Main Street, which is narrow and congested.

Background concentrations of NO_2 and particulate matter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$) were obtained from the latest mapped data provided by Defra for the grid squares covering the Study Area (Defra, 2020) for 2022. Background concentrations were obtained for the onshore scoping extent, which covers a large area. The maximum, minimum and average concentrations for each pollutant were calculated and are summarised in Table 7.18.

Table 7.18 Latest Mapped Background Pollutant Data for 2022

	2022 Annual Mean Background Concentration (µg m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$
Maximum	13.81	12.13	7.36
Minimum	3.02	9.47	5.76
Average	4.61	10.50	6.24
	Annual mean Objective of 40 µg m^{-3}		Annual mean Objective of 25 µg m^{-3}

As detailed in Table 7.18, the maximum background pollutant concentrations at grid squares covering the wider area are 'well below', i.e. less than 75% of, the annual mean Objectives. It should be noted there is wide variation in NO_2 concentrations across the area; this is likely to be due to rural areas experiencing low NO_2 concentrations at a distance from road or industrial sources, and elevated traffic-related pollutant concentrations in the more built-up locations and urban centres. Particulate concentrations show less variation, as generally ambient levels can be affected by more distant emission sources which may be

include industrial processes, agricultural activities and a contribution of sea salt aerosol due to the coastal location.

7.11.4 Potential Impacts

The scope with regard to air quality is summarised in Table 7.19.

Table 7.19 Summary of Key Sensitivities and Potential Impacts for Air Quality

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Human receptors	Construction phase dust soiling from demolition, earthworks and construction activities, and from the transfer of mud and dirt onto the public highway (trackout)	Yes	These effects may still occur from the export cable route construction
	Construction phase human health impacts from dust and fine particulate matter generated during construction activities	Yes	These effects may still occur from the export cable route construction
	Construction phase human health impacts from road vehicle emissions.	Yes	These effects may still occur from the export cable route construction
Ecological receptors	Construction phase ecological impacts from dust and fine particulate matter from any demolition, earthworks and construction activities, and from the transfer of mud and dirt onto the public highway (trackout)	Yes	These effects may still occur from the export cable route construction
	Construction phase ecological impacts from road vehicle emissions.	Yes	These effects may still occur from the export cable route construction
Operational Phase			
Human receptors	Operational phase human health impacts from road vehicle emissions.	No	There will not be any significant operational phase emissions to air
Ecological receptors	Operational phase ecological impacts from road traffic emissions	No	There will not be any significant operational phase emissions to air
Decommissioning Phase			

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Human receptors	Decommissioning phase dust and fine particulate matter and exhaust emission impacts	Yes	These effects may still occur from the onshore decommissioning
Ecological receptors	Decommissioning phase dust and fine particulate matter and exhaust emission impacts	Yes	These effects may still occur from the onshore decommissioning
Cumulative Impacts are scoped in for this receptor group			

7.11.5 Potential Mitigation

The potential mitigation proposed is as follows:

- Best-practice methods to minimise dust and particulate matter during construction;
- Avoidance of designated ecological sites for landfall and onshore cable route where possible; and
- Minimisation of vehicle movements during the construction phase, particularly in sensitive areas such as the Pembroke AQMA.

7.11.6 Environmental Assessment Approach

During construction, Non-Road Mobile Machinery (NRMM) and plant operations can increase air emissions which may impact upon human and ecological receptors. Technical guidance provided by Defra (Defra 2018) states that emissions from NRMM on construction sites are typically unlikely to lead to significant air quality impacts. However, intensive construction activities, for example Horizontal Directional Drilling (HDD) works, may temporarily increase pollutant concentrations in the vicinity of receptors. The location of human and ecological receptors in relation to construction works will be reviewed to determine whether any further assessment of emissions from NRMM is required. If required, this assessment may be qualitative or quantitative depending on the scale and nature of activities, their duration and existing air quality conditions.

The number of road vehicle movements on the local network associated with the land side infrastructure construction will be screened to determine whether potential effects at local receptors are possible, and if required a road emissions dispersion modelling study will be undertaken.

The air quality receptors which will be considered will be those residential properties and, if present, sensitive ecological habitats, in closest proximity to the construction activities at the landfall and as the landside installation progresses.

7.12 Tourism and Recreation

This section describes the tourism and recreation baseline environment and potential effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

As discussed in Section 3.2, the Welsh National Marine Plan has been published and this includes the following policy of relevance to Tourism and Recreation:

Policy ECON_02, Coexistence –

"*Proposals should demonstrate how they have considered opportunities for coexistence with other compatible sectors in order to optimise the value and use of the marine area and marine natural resources.*"

7.12.1 Data and Information Sources

The baseline has been informed using spatial data from Wales Marine Planning Portal (Welsh Government, 2022). Various recreation and tourism websites were also reviewed, providing useful sources of information e.g. Visit Pembrokeshire.

7.12.2 Study Area

The Study Area for this topic encompasses the onshore and offshore components of the Project Area (Figure 2.1).

7.12.3 Existing Environment

7.12.3.1 Marine Recreational Users

Recreational boating intensity varies between low to medium intensity in the Study Area. Activity is higher to the west side of the Study Area, overlapping with the main shipping channel entering the port of Milford Haven. Activity is lowest to the southeast of the Study Area (Welsh Government, 2022). Boating activity is generally high in the Milford Haven where there are nine RYA clubs, nine RYA training centres (often at the same location as the clubs), four marinas, and 13 slipways; making it a readily accessible estuary for recreational boating activity. There are also numerous anchorage areas (informal and formal) in Milford Haven.

There are numerous sea angling boats (private and charter) operating from various locations in Pembrokeshire (e.g. Pembroke Dock, Tenby and Saundersfoot). None appear to be operating from locations between Freshwater West around the coast to Bullslaughter Bay, most likely due to the presence of the MoD firing range and general access constraints. However, angling boats are likely to be active in the sea to the south of the Pembrokeshire coast when MoD activity is not in operation.

Diving is a popular activity in Pembrokeshire, particularly around ship wrecks and reefs. This includes drift diving and seal diving. Diving boats generally launch from Freshwater East (one of the potential landfalls) and Dale, Little Haven and Martin's Haven (all further north than the Project Area). Divers do however appear to be active in the Study Area, including dive sites at Castlemartin Cliffs. Licensed dive operators tend to stay within 3 km of the coast but solo divers may operate further offshore.

There are no formal anchorages along the south coast of Pembrokeshire within the MoD Danger Area; however nearby, Freshwater Bay and Barafundle Bay traditionally provide sheltered anchorages for vessels passing through this area (NRW, 2015).

7.12.3.2 Intertidal and coastal recreational users

As set out in the Project Description, possible export landfall locations include Freshwater West (beach), Bullslaughter Bay (beach), New Quay Beach (narrow channelled beach), Greenala Point (cliff), Broad Haven South (beach), Freshwater East (beach).

Freshwater West is a very open, long stretch of beach attracting many recreational users including walkers, anglers, kayakers, horse riders and surfers in the winter. The beach is a popular film location and also attracts tourists. Rocky reefs at the south end of the beach and some quiet bays at the north end can be popular in peak holiday seasons. The beach has achieved 'higher' bathing waters compliance attracting swimmers; however the beach is exposed to rip tides.

Bullslaughter Bay is a secluded beach, surrounded by high craggy cliffs. Access is gained by foot or by abseiling. Climbers are known to visit the area at low tides throughout the year. The beach is located within the MoD firing range, hence access is only permitted when firing is not taking place; usually weekends, Bank Holidays and evenings (although on occasion night firing does take place). As such, recreational use of the beach is limited. Sea kayakers explore this section of coast and are likely to stop off at this sheltered beach.

New Quay Beach is also secluded, located within the MoD firing range. It is a narrow channelled beach, located adjacent to St Govan's Head. There are established pedestrian access tracks down to the beach, but recreational use of the beach is limited.

Broad Haven South is a large, sandy beach with sand dunes to rear (leading to the National Trust owned Bosherston Lakes) and cliffs to sides. It has established pedestrian access, dedicated car park, and is a popular tourist destination. It has many recreational users including walkers, anglers, kayakers, horse riders and surfers It is a Seaside Award and Green Coast Award beach, with 'Excellent' designated bathing water quality. However, it is known to have strong currents. Church Rock, located within the bay, is a popular scuba diving location.

Freshwater East is a large, open sandy beach, popular with tourists. It has many recreational users including walkers, anglers, kayakers, horse riders and surfers.

7.12.3.3 Other recreational users and tourists

Latest tourism statistics, avoiding years affected by Covid lockdowns (Destination Research, 2020), indicate that approximately 7 million people visited Pembrokeshire in 2019, spending £429 million in the local economy and directly supporting 9,244 full time equivalent (FTE) jobs.

Pembrokeshire is very popular with walkers and wildlife enthusiasts, particularly for coastal paths with uninterrupted views of the sea. The Pembrokeshire Coastal Path crosses Freshwater West at the northern end and could be crossed by a terrestrial cable route. The Path also travels along the coast next to Bullslaughter Bay but this part of the Path is only accessible when the firing ranges are not in operation. The path also passes by New Quay Beach, Broad Haven South, Greenala Point and Freshwater East landfall options. Cyclists regularly use Pembrokeshire roads, particularly in summer months. The area attracts many tourists and local users in summer months travelling by road.

7.12.4 Potential Impacts

The scope with regard to tourism and recreation is summarised in Table 7.20 and Table 7.21.

Table 7.20 Summary of Key Sensitivities and Potential Impacts for Tourism and Recreation (Offshore)

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Recreational boating (incl. sea angling and diving boats)	Temporary obstruction to regular vessel routes due to installation of export cables, establishment of safety zones or avoidance of the area by vessels for safety reasons	Yes	Although there is likely to be low levels of activity in proximity to the offshore PDZ area (due to PDZ distance offshore and that main navigation channels are outside of this area), the risk of interactions exists. As the highest intensity of recreational boat activity occurs inshore, there is a risk for interactions with export cable routes to the remaining landfall options.
Recreational boating (incl. sea angling and diving boats)	Increased risk of vessel collision either with PDZ infrastructure or due to displacement (and increased vessel density elsewhere). Potentially also a risk during export cable installation.	Yes	Although there is likely to be low levels of activity in proximity to the offshore PDZ area (due to PDZ distance offshore and that main navigation channels are outside of this area), the risk of interactions exists.
Sea angling (private and charter vessels)	Effects on spawning areas, or migration patterns, thus impacting on abundance of target species	Yes	As above.
Divers	Obstruction and safety risks to divers operating in proximity to infrastructure under construction.	Yes	As above.
Operational Phase			
Recreational boating (incl. sea angling and diving boats)	Obstruction to regular vessel routes due to establishment of safety zones or avoidance of the area by vessels for safety reasons	Yes	It is acknowledged that due to the project design of 1 offshore MOS platform, it is unlikely this effect will be significant. However, it is scoped in to be evidenced further in the EIA process.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Recreational boating (incl. sea angling and diving boats)	Increased risk of vessel collision either with PDZ infrastructure or due to displacement (and increased vessel density elsewhere). Potentially also a risk during export cable installation.	Yes	As above
Sea angling (private and charter vessels)	Effects on spawning areas, or migration patterns, thus impacting on abundance of target species	Yes	As above.
Decommissioning Phase			
Decommissioning impacts are anticipated to be of lower magnitude than construction.			
Cumulative Impacts are scoped in for this receptor group			

Table 7.21 Summary of Key Sensitivities and Potential Impacts for Tourism and Recreation (Coastal and Terrestrial)

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Beach users at Freshwater West, Bullslaughter Bay, Broad Haven South and Freshwater East.	Obstruction and disturbance (visual and noise) to beach and coastal path users (most likely to be temporary), including tourists and recreational users, due to installation of possible export cable routes, landfalls, and associated infrastructure (e.g. transmission pit, sub-station) during installation	Yes	Freshwater West, Broad Haven South and Freshwater East are popular in summer months, and the impact on recreational users and tourist could deter repeat visits. Bullslaughter Bay is less popular but the potential impact remains.
Walkers, cyclists and car users	Temporary obstruction and disturbance (visual and noise) to walkers and cyclists due to installation of export cables and associated infrastructure on land.	Yes	Onshore export cable laying could result in roads delays; potentially deterring repeat visits.

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Recreation and tourism service providers	Obstruction and disturbance (visual and noise) to some accommodation and service providers located near to possible areas of works.	Yes	Whilst the number of interactions is likely to be low (with more certainty around this developing as onshore cable routing is refined), the impact upon individual receptors could be high.
Recreation and tourism service providers	Increased business and bookings for retail and accommodation providers.	Yes	Due to construction workers from outside Pembrokeshire staying locally whilst work is completed.
Operational Phase			
Pembrokeshire Coastal Path	Visual impacts of PDZ infrastructure on coastal walkers seeking uninterrupted sea views	Yes	The above-surface offshore infrastructure is limited to 1 offshore MOS platform (approx. 17.5km offshore). For this reason, the potential magnitude of visual impacts is likely to be highly reduced. The impact remains scoped in pending results of SLVIA.
Decommissioning Phase			
Decommissioning impacts are anticipated to be of lower magnitude than construction.			
Cumulative Impacts are scoped in for this receptor group			

7.12.5 Potential Mitigation

Potential mitigation that will be considered during the next design stage includes:

- Early engagement with possible affected parties e.g. the yachting community, the Port of Milford Haven, PCNPA Officers, sea anglers, divers and recreation and tourism service providers; and
- Measures such as using appropriate warnings and navigational markers in accordance with Trinity House procedures, and consideration to the timing of installation works (e.g. avoid summer months).

7.12.6 Environmental Assessment Approach

All recreational clubs and societies, the Port of Milford Haven, PCNPA Officers, recreation and tourism agencies and service providers, and the emergency services will be consulted early in the EIA process; in order to ascertain any potential risk of negative interactions, and potential design mitigation solutions. An engagement process will be set out and agreed via a liaison officer. The RYA and Welsh Yachting Association are likely to be the main points of contact with affiliated clubs, for offshore racing societies and cruising clubs etc.

7.13 Socio-economics

This section describes the socio-economics baseline environment and potential effects associated with the construction, operation and decommissioning of the Pembrokeshire Demonstration Zone.

As discussed in Section 3.2, the Welsh National Marine Plan has been published and this includes the following policies of relevance to Socio-economics:

SOC_02: Well-being of coastal communities –

Proposals that contribute to the well-being of coastal communities are encouraged.

ECON_01: Sustainable economic growth –

Proposals for economically sustainable activities are encouraged, particularly where they contribute to:
the sustainable management of natural resources thereby supporting ecosystem resilience;
a more resilient economy;
employment opportunities particularly for coastal communities;
protecting and creating employment at all skill levels;
maintaining communities with a high-density of Welsh speakers; and/or
tackling poverty by supporting deprived coastal communities.

ECON_02: Coexistence –

Proposals should demonstrate how they have considered opportunities for coexistence with other compatible sectors in order to optimise the value and use of the marine area and marine natural resources.

7.13.1 Data and Information Sources

The baseline is informed by a desktop study of publicly available data from:

- StatsWales (2022);
- Office for National Statistics (Welsh Government, 2022); and

The findings of a separate and more detailed Socio-Economic Study completed for Wave Hub Ltd alongside this Scoping Study.

7.13.2 Study Area

The Study Area for the assessment of impacts on socio-economics is the administrative area of Pembrokeshire. Data is also presented for Wales and the UK for comparison purposes.

7.13.3 Existing Environment

7.13.3.1 Population

The most recent mid-year population estimates indicate that Pembrokeshire has a population of 126,751 people, an increase of 3% over the preceding ten years. This is the same increase as Wales over the same period (3% increase) and less than the UK increase over the same time (6%). Table 7.22 shows the population of Pembrokeshire, alongside Wales and the UK for context.

Table 7.22 Mid-Year Population Estimates by Area

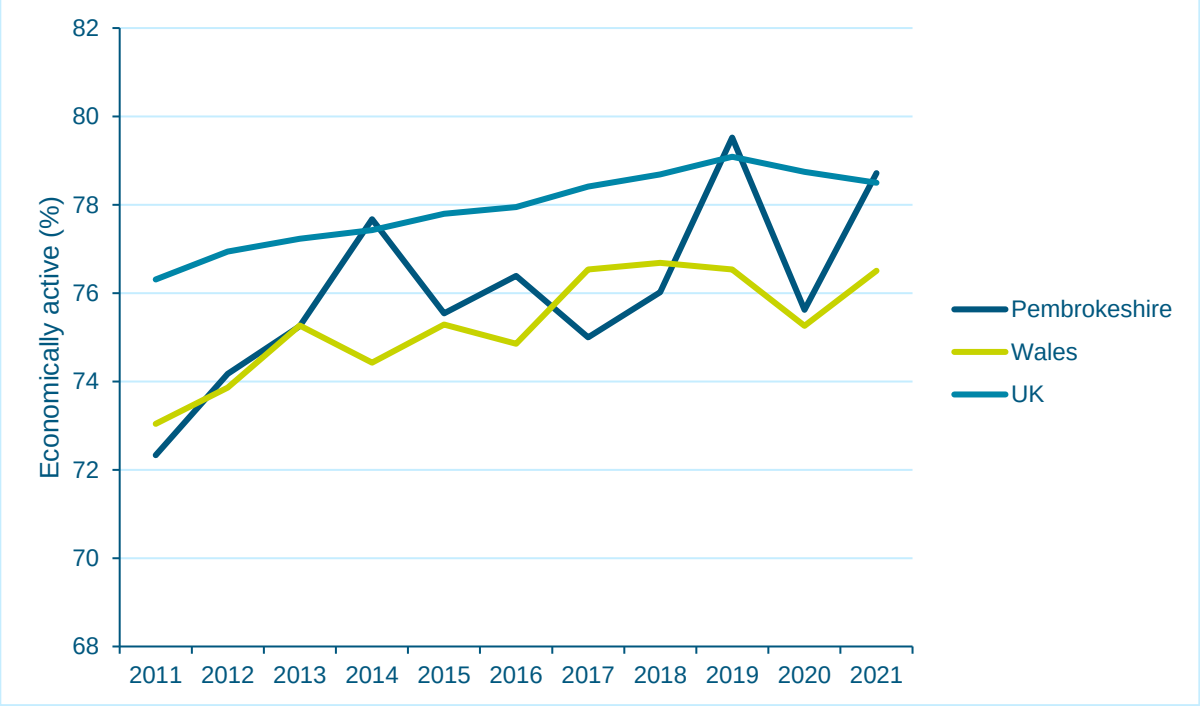
Area	Population (2020)	Population (2011)	% Change
Pembrokeshire	126,751	122,613	3
Age 0-15	21,363	22,002	-3
Age 16-64	72,219	73,697	-2
Age 65+	33,169	26,914	23
Wales	3,169,586	3,063,758	3
Age 0-15	562,730	555,841	1
Age 16-64	1,938,266	1,941,524	0
Age 65+	668,590	566,393	18
UK	67,081,234	63,285,145	6
Age 0-15	12,727,569	11,882,880	7
Age 16-64	41,845,027	40,944,079	2
Age 65+	12,508,638	10,458,186	20

Mid-year population estimates, Office for National Statistics (last update 2022)

Table 7.22 shows that Pembrokeshire's population growth has all been in the over 65 years age group (23%); whilst there has been a decrease in the economically active age range (16-64 years) and in the youngest age range (0-15 years). This is similar to the pattern in Wales, although not to the same extent. In the UK, there has been an increase in all age ranges.

7.13.3.2 Economically Active

Latest statistics (mid-2021) show that 79% of people aged 16-64 years in Pembrokeshire are economically active (i.e. in employment or seeking employment). This is higher than Wales (77%), and slightly higher than the UK (78%). The trend in the UK over the last ten years is mirrored by Wales but as Plate 7.1 shows, the trend in Pembrokeshire is more dynamic. In 2014, 2019, and 2021, the percentage of economically active people was greater in Pembrokeshire, than in both Wales and the UK. In other years the percentage in Pembrokeshire dropped below that of the UK (and below Wales in 2011, 2017, and 2018).

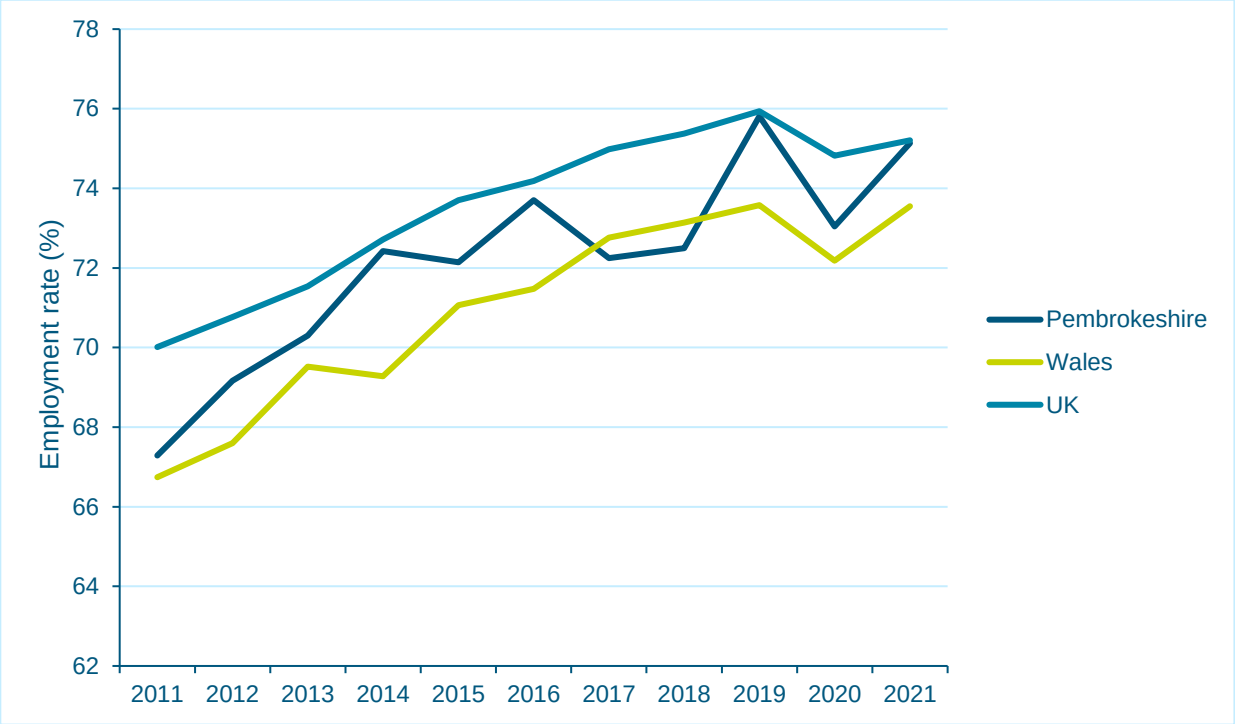


Source: Annual Population Survey, Office for National Statistics (Last update 2022)

Plate 7.1 Percentage of Economically Active People by Area

7.13.3.3 Employment Rate

Similarly, the statistics show that the employment rate in Pembrokeshire over the last ten years has been very dynamic. As Plate 7.2 shows, the employment rate in Pembrokeshire has, on the whole, been higher than the rate in Wales (except for 2017 and 2018), but that it is always less than the UK. Over the last ten years, the employment rate has increased from 67.3% to 75.1%.

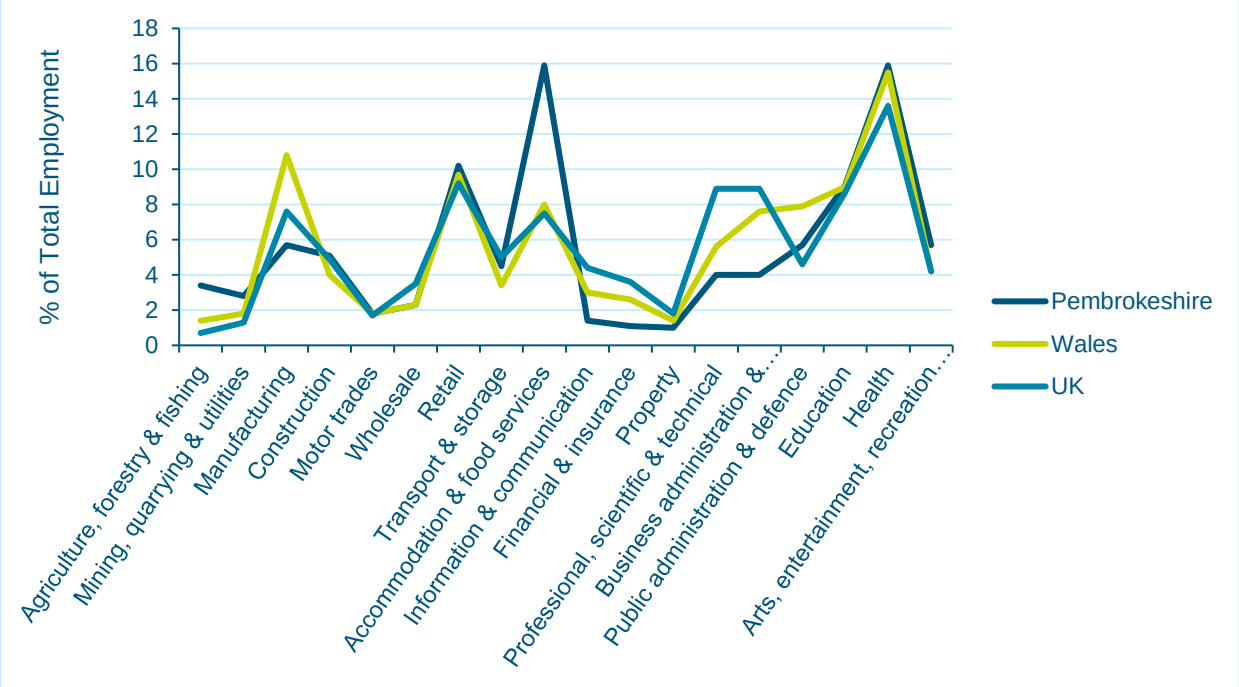


Source: Annual Population Survey, Office for National Statistics (last update 2022)

Plate 7.2 Employment Rate by Area

7.13.3.4 Workplace Employment by Broad Industry

Latest available data (2021) shows that approximately 43,850 jobs were located, by workplace, in Pembrokeshire. Plate 7.3 shows how this breaks down by broad industry group, compared to Wales and the UK. Broadly speaking, the pattern in Pembrokeshire follows the trend in both Wales and the UK. The data shows that Pembrokeshire has a higher percentage of jobs in 'agriculture, forestry and fishing' and 'accommodation and food services' than both Wales and the UK. The largest broad industry sectors in Pembrokeshire by workplace employment are 'accommodation and food services', 'retail', and 'health'. It should be noted that these figures do not include self-employment, including certain types of sea-fishing, and thus will understate total employment.

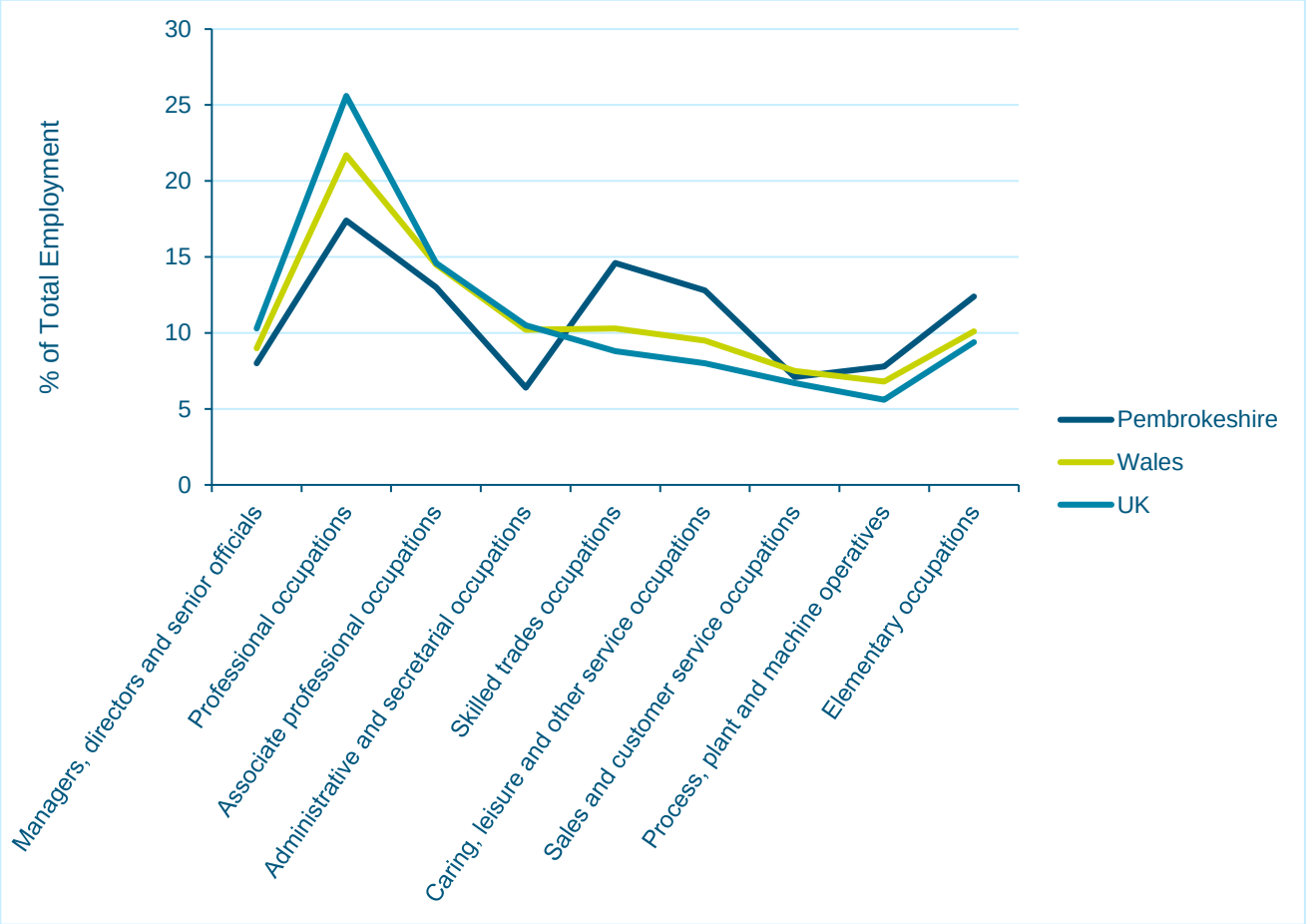


Source: Annual Population Survey and Business Register Employment Survey (BRES), Office for National Statistics (last update 2021)

Plate 7.3 Workplace Employment by Broad Industry

7.13.3.5 People in Employment by Occupation

Pembrokeshire has a higher percentage of people in ‘Skilled trades occupations’, ‘Caring, leisure and other service occupations’, ‘Process, plant and machine operatives’, and ‘Elementary occupations’ than both Wales and the UK. For all other occupations, it has a lower percentage; albeit the distribution of jobs by occupation type broadly follows the same pattern as for Wales and the UK (see Plate 7.4).



Source: Annual Population Survey, Office for National Statistics (last update 2022)

Plate 7.4 Percentage of People in Employment by Occupation

7.13.3.6 Business and enterprise

Table 7.23 gives data on the number of active enterprises in Pembrokeshire, Wales and the UK. There are 6,700 enterprises located in Pembrokeshire. Most of these are in 'Agriculture, forestry & fishing' (20%) 'Accommodation & food services' (12%) and 'Construction' (10%).This is a broadly similar pattern to Wales, but the UK has a greater proportion of 'Professional, scientific & technical' enterprises.

Table 7.23 Enterprises by Industry and Area in 2022

Industry	Pembrokeshire	Wales	UK
Agriculture, forestry & fishing	1,335	13,780	146,420
Accommodation & food services	800	11,315	223,225
Construction	695	14,890	385,755
Retail	610	13,315	317,005
Professional, scientific & technical	525	12,195	451,995
Business administration & support services	470	9,780	272,675
Arts, entertainment, recreation & other services	425	8,480	210,130
Production	380	7,515	171,205
Health	300	7,960	163,995
Transport & Storage (inc. postal)	200	6,550	154,665
Wholesale	195	4,155	127,650
Motor trades	180	4,375	91,990
Information & communication	145	4,655	204,475
Education	140	3,295	77,140
Property	120	3,675	123,890
Finance & insurance	90	2,350	73,675
Public administration & defence	90	1,745	24,090
Total	6,700	130,030	3,219,980

7.13.3.7 Gross Value Added (GVA)

Gross value-added (GVA) is one of the most widely used measures of economic impact. It is defined as the contribution to the economy (value of goods or services) of each individual producer, industry or sector. In 2020 (latest available data), Pembrokeshire GVA was £2,337m which corresponded to £18,348 per head. In Wales in the same year, GVA was £66,591m equivalent to £21,009 per head (compared to £29,063 per head in the UK) (Office for National Statistics, 2022).

7.13.3.8 Welsh Index of Multiple Deprivation (WIMD)

WIMD is the Welsh Government's official measure of relative deprivation for small areas in Wales. It is designed to identify pockets of deprivation for different 'domains': Employment, Income, Education, Health, Community Safety, Physical Environment, Access to Services and Housing. Deprivation is the lack

of access to opportunities and resources which we might expect in our society. This can be in terms of material goods or the ability of an individual to participate in the normal social life of the community.

WIMD ranks all small areas in Wales from most deprived to least deprived. As shown on Appendix A, Figure A7.13.1, there are areas of deprivation in Pembroke which fall within Wales' 10% most deprived small areas. This is in terms of income, employment and education. There are some areas that fall within Wales' 10-50% most deprived, but most of Pembrokeshire (in terms of land area) falls within Wales' 50% least deprived.

7.13.3.9 Socio-economic contribution of the PDZ

A study outlining the estimated direct, indirect, and induced effects of the PDZ on GVA and employment will accompany the socio-economics technical chapter within the ES.

In addition to GVA and employment benefits, a wide range of other benefits could be realised as a result of investment in the PDZ, which in turn will all indirectly contribute to economic well-being in the region, including:

- Reduced carbon emissions;
- Improvements to existing infrastructure;
- Increased knowledge as a result of research and development in wave and floating wind technologies;
- Supply chain development/clustering increasing Wales' ability to service future domestic and international demand;
- Improvements to energy security (depending on the mix of electricity generation displaced); and
- Positive social impacts, such as impacts on employment, inequality and earnings.

7.13.4 Potential Impacts

The scope with regard to socio-economics is summarised in Table 7.24.

Table 7.24 Summary of Key Sensitivities and Potential Impacts for Socio-economics

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Construction Phase			
Aging Population	Help to decrease proportion of population that is no longer economically active.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project.
Economically Active and Employment	Help to increase proportion of population in economically active age range who are in employment. Will help to narrow the gap with Wales and UK averages.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project. There is a risk that the benefit may be lower for the local population depending on whether they benefit from created jobs or not. Irrespective, local enterprises will benefit from indirect and induced spend (in local retail etc).

Receptor / Receptor Group	Potential Impact	Scoped into EIA?	Rationale for EIA scoping
Employment by Occupation	Help to reverse trends in employment by occupation. Pembrokeshire has experienced a greater decline in all occupations other than 'professional occupations', 'process, plant and machine operatives' compared to Wales and UK.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project. It is recommended that this impact is combined with all other employment impacts in the EIA.
Business Enterprises by Industry	Could help reduce a considerable decline in 'financial and business services' and 'Private sector health and education' in recent years. Will boost enterprises in 'Production'.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project. Could help to narrow the gap with Wales and UK averages. This depends on how much investment in the Project is retained in the local economy or not.
GVA and Productivity	Help improve GVA per head in relation to Wales and UK averages.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project. Could help to narrow the gap with Wales and UK averages. This depends on how much investment in the Project is retained in the local economy or not.
Wales' 10% Most Deprived Areas	More opportunities for very deprived areas in Pembrokeshire.	Yes	This positive impact could occur via jobs created and safeguarded in Pembrokeshire and Wales as a result of investment in the Project. Could help to narrow the gap with Wales and UK averages. This depends on how much investment in the Project is retained in the local economy or not.
Operational Phase			
Operational impacts are anticipated to be similar in nature to construction.			
Decommissioning Phase			
Decommissioning impacts are anticipated to be similar in nature to construction.			
Cumulative Impacts are scoped in for this receptor group			

7.13.5 Potential Mitigation

Mitigation and monitoring measures will be identified early on via engagement with local agencies (e.g. Pembrokeshire County Council, Marine Energy Wales, Swansea City Deal, Welsh European Funding Office) for consideration during on-going environmental assessments and Project development activities. These may entail for example, investigation of measures to maximise supply chain and training opportunities in Pembrokeshire and Wales; and monitoring of Project expenditure, particularly in terms of local employment and business opportunities (e.g. via contracts).

7.13.6 Environmental Assessment Approach

As the environmental impacts of future renewable installations that may connect to the PDZ MOS platform are not proposed to be assessed in the upcoming EIA for this Project, likewise the socio-economic benefits of said future projects should not be assessed in the EIA. These benefits will be assessed in separate and standalone EIAs to be conducted for each project that wishes to utilise the grid connection point provided by the PDZ MOS platform. Therefore, the data following data collection works will be reported on relating to the PDZ MOS platform:

1) Liaise with Marine Energy Wales regarding opportunities to maximise supply chain opportunities in Pembrokeshire and Wales. This will allow an evaluation of the capacity, capability and aspiration of local supply chain to capture investment in the Project. Socio-economic benefits to Pembrokeshire of investment in the Project will be maximised if spend in Pembrokeshire can be retained to as large a proportion as possible. Working with the local supply chain as much as possible will help to maximise such benefits to local enterprises and the local population.

2) Further refine the socioeconomic study once more detail on Project spend, developers, timescales etc. is known. This will enable estimates of number of jobs supported, and an understanding of what type, where located, in what sectors and whether the local population can fill such needs. Again, working with the local supply chain as much as possible will help to maximise such benefits to local enterprises and the local population.

8 Summary of EIA Scoping

This Chapter summarises the Scoping Assessment as provided in the individual topic chapters (see Table 5.8 to Table 7.24). It does not provide a summary for designated site assessment, due to the large number of sites, Table 6.2 should be referred to, to provide information in this regard. The potential impacts on the various ecological features of protected sites are, however, incorporated into the following tables.

Table 8.1 Key for the Potential Impact Scoping Summary Table 8-2

Key for the potential impact scoping summary	
✓	Scoped into the EIA
x	Proposed to scope out of the EIA
C	Construction Phase
O&M	Operation and Maintenance Phase
D	Decommissioning Phase

Table 8.2 Summary of Potential Impacts and Scope of EIA

Topic/Receptor	Potential Impact	C	O&M	D
Marine Coastal Processes				
Sedimentary and morphological regime	Potential for enhanced concentrations of suspended sediments, and subsequent sediment deposition arising from disturbance of the seabed.	✓	✓	✓
Hydrodynamic regime	Changes to the baseline tidal, and wave regimes	✓	✓	✓
Sedimentary and morphological regime	Changes to the baseline sedimentary and morphological regimes.	✓	✓	✓
Coastal geological designated sites	Physical disturbance to geological features of interest	✓	x	✓
Coastal morphology	Changes to the coast as a result of landfall works	✓	x	✓
Marine sediment and water quality				
Water Quality (suspended solids concentrations)	Change in concentrations of suspended sediment in the water column associated with Project works	✓	✓	x
Water Quality (chemical and physical parameters such as dissolved oxygen and nutrients)	Deterioration in water quality associated with release of sediment bound contamination.	✓	✓	x
Onshore Geology, Geomorphology and Soils				
Geology and geomorphology	Physical disturbance to geological features of interest (including national and regionally designated sites).	✓	x	✓
Mineral Safeguarding Areas	Loss, damage or sterilisation of mineral resources.	✓	✓	✓

Topic/Receptor	Potential Impact	C	O&M	D
Construction workers, current on and offsite users	Impacts on human health both on and off site from contamination sources.	✓	x	x
Onshore Groundwater and Hydrology				
Surface watercourses crossed by cable route	Direct impacts on the hydrology and geomorphology of surface watercourses	✓	✓	✓
Surface watercourses with construction activities within catchment	Increase in the supply of fine sediment to surface watercourses	✓	x	✓
All surface watercourses and groundwater	Accidental release of contaminants to surface waters	✓	x	✓
All surface watercourses and groundwater	Increased runoff and altered subsurface flows; earthworks have the potential to alter surface water flows, drainage patterns and increase surface water runoff	✓	✓	✓
All surface watercourses and groundwater	Changes to flood risk during construction	✓	✓	✓
Water Framework Directive				
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Direct disturbance of the seabed, resuspension of fine sediment and accidental release of contaminants	✓	✓	✓
Biology, hydromorphology and physico-chemistry of coastal and transitional water bodies	Changes to baseline tidal flows, wave patterns and fish migration as a result of indirect impacts	✓	✓	✓
Biology, hydromorphology and physico-chemistry of river and lake water bodies	Direct disturbance to surface watercourses, increases in sediment supply, the accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	✓	✓	✓
Chemical and quantitative status of groundwater bodies	The accidental release of contaminants and changes to surface and sub-surface flows due to onshore activities	✓	✓	✓
Designated sites – see Section 6.1				
Benthic Subtidal and Intertidal Ecology				
All subtidal and intertidal habitats and species	Physical disturbance and habitat loss	✓	✓	✓

Topic/Receptor	Potential Impact	C	O&M	D
All subtidal and intertidal habitats and species	Increased suspended sediment concentrations and subsequent deposition	✓	✓	✓
All subtidal and intertidal habitats and species	Remobilisation of contaminated sediments	✓	✓	✓
All subtidal and intertidal habitats and species	Introduction of hard substrate	✓	✓	✓
All subtidal and intertidal habitats and species	Unplanned/accidental release of pollutants or chemicals into the water column from work vessels	x	x	x
All subtidal and intertidal habitats and species	Accidental introduction of Invasive Non-native Species (INNS)	✓	✓	✓
All subtidal and intertidal habitats and species	Interactions with EMF	x	x	x
Fish and Shellfish Ecology				
Demersal fish, shellfish, and nursery/spawning grounds	Temporary habitat loss and/or physical disturbance during cable trenching and laying	✓	✓	✓
Demersal fish, shellfish, and nursery/spawning grounds	Increased suspended sediments and sediment re-deposition	✓	**x**	✓
All groups (Particularly migratory species)	Barrier effects	✓	✓	✓
All receptor groups	Underwater noise	✓	x	✓
Demersal fish and shellfish	Cable operation causing an increase in temperature	x	x	x
All receptor groups	Permanent habitat loss	x	✓	x
Marine Mammals and Reptile Ecology				
All marine mammals	Increased levels of underwater noise (foundation installation, cable laying, vessels)	✓	x	✓
Marine reptiles	Increased levels of underwater noise (foundation installation, cable laying, vessels)	✓	x	✓
All marine mammals	Increased levels of underwater noise (UXO clearance)	x	x	x

Topic/Receptor	Potential Impact	C	O&M	D
All marine mammals and reptiles	Collision risk from vessels and machinery within the Study Area	✓	x	✓
All marine mammals and reptiles	Unplanned/accidental release of pollutants or chemicals into the water column from work vessels	x	x	x
All marine mammals and reptiles	Increased suspended sediment concentrations and subsequent deposition	✓	x	✓
All marine mammals and reptiles	Changes to prey resource	✓	x	✓
Pinnipeds	Presence of project vessels near the coast could cause physical disturbance to seals at haul out sites	✓	✓	✓
All marine mammals and reptiles	Physical barrier effects	x	x	x
Cetaceans	Emission of EMF during operation of the Project could cause interference/disruption to cetacean navigation.	x	x	x
Terrestrial Ecology - Habitats				
Sand dunes (incl. fixed, mobile & dune slacks	Direct harm to and loss of dune habitats resulting from cable excavation and transition pit works	✓	**x**	✓
Vegetated sea cliffs and slopes	Drilling or trenching through limestone cliffs. Direct harm to ledges/crevices, cliff-top grassland and cave habitats.	✓	**x**	✓
Maritime and dry heath; Calcareous grassland	Direct harm to and loss of grassland and heath, affecting conservation status.	✓	**x**	✓
Neutral unimproved grassland (lowland meadows)	Direct harm to and loss of grassland, affecting conservation status.	✓	**x**	✓
Field margins	Direct harm to and loss of margins and habitat fragmentation affecting conservation status.	✓	**x**	✓
Wetlands	Indirect harm through e.g. pollution incident or flow changes in connected watercourse.	✓	**x**	✓
Semi-natural broadleaved woodland	Cable routes between landfall site and grid connection could affect woodland areas. Loss of deciduous trees and associated woodland habitat and species.	✓	**x**	✓
Ponds and lakes	Potential impacts on Bosherton Lakes and tributaries from cable routes between landfall site and grid connection.	✓	**x**	✓
Streams and rivers	Temporary working to install onshore cables across watercourses. Temporary damage to habitats affecting their conservation status; potential pollution release, potential effects on connected wetland habitats.	✓	**x**	✓
Roadside verges	Direct harm to and loss of margins and habitat fragmentation affecting conservation status.	✓	**x**	✓

Topic/Receptor	Potential Impact	C	O&M	D
Terrestrial Ecology – Species				
Greater and lesser horseshoe bats (*R. hipposideros; R. ferrumequinum*)	Potential for damage and disturbance to roost sites. (Freshwater West, Bullslaughter Bay, New Quay Beach and Broad Haven South landfalls and associated cable routes)	✓	x	✓
Brown long-eared bat (*Plecotus auritus*)	Installation of landfall sites and onshore cabling (all landfall options) affecting potential roosting and foraging habitat, including linear features. Potential for damage and disturbance to roost sites.	✓	x	✓
Myotis bat species (*M. nattereri; M. daubentonii; M. mystacinus*)	As per brown long-eared bat.	✓	x	✓
Common pipistrelle *(P. pipistrellus)*	As per brown long-eared bat.	✓	x	✓
Hazel dormice (*Muscardinus avellanarius*)	Installation of landfall sites and onshore cabling (all landfall options) affecting potential habitats suitable for hazel dormice.	✓	x	✓
Otter (*Lutra lutra*)	Installation of landfall sites and onshore cabling at landfall options through coastal habitats potentially used by otter. Potential for disturbance to foraging and for holts to be damaged or disturbed.	✓	x	✓
Silver-studded blue butterfly (*Plebejus argus*)	Installation of landfall sites and onshore cabling could affect potentially suitable habitats.	✓	x	✓
Early gentian (*Gentianella anglica*)	Installation of landfall sites and onshore cabling could affect potentially suitable habitats.	✓	x	✓
Petalwort (*Petalophyllum ralfsii*)	Installation of landfall sites and onshore cabling could affect dune slack habitat. Direct loss of plants and reduction in habitat quality.	✓	x	✓
Small restharrow (*Ononis reclinata*)	Drilling or trenching through limestone cliffs resulting in direct loss of plants and reduction in habitat quality.	✓	x	✓
Fen pondweed (*Potamogeton coloratus*)	Potential reduction in habitat quality from changes in hydrology or water quality in upstream catchment from cable crossings.	✓	x	✓
Ornithology - offshore				
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	✓	✓	✓
Foraging birds	Indirect impacts due to habitat loss for prey, mortality displacement or aggregation of prey	✓	x	✓
All seabird and diving species	Direct impact of displacement of birds due to human activity and noise.	✓	x	✓
Birds migrating and / or foraging at sea	Direct impact due to collision risk	x	✓	x

Topic/Receptor	Potential Impact	C	O&M	D
Birds migrating and / or foraging at sea	Indirect impact due to barrier effect	x	✓	x
Ornithology - onshore				
Breeding, roosting and foraging birds	Direct impact of habitat loss/disturbance	✓	x	✓
Foraging birds	Indirect impacts due to habitat loss for prey or displacement of prey	✓	✓	✓
Breeding, roosting and foraging birds	Direct impact of displacement of birds due to disturbance from human activity and noise.	✓	x	✓
Commercial Fisheries				
Commercial fishing vessels	Reduction in access to, or exclusion from established fishing grounds	✓	✓	✓
Commercial fishing vessels	Reduction in access to, or exclusion from established fishing grounds (inshore)	✓	✓	✓
Commercial fishing vessels	Collision risk between fishing vessels and PDZ infrastructure	✓	✓	✓
Commercial fishing vessels	Effects on spawning areas, or migration patterns (including the risk of electro-magnetic interference)	✓	✓	✓
Commercial fishing vessels	Displacement of regular vessel routes due to statutory exclusion or establishment of safety zones around PDZ or around export cables.	✓	✓	✓
Intertidal commercial and hobby fishermen	Export cable routes (and associated infrastructure) as well as potential cable landfall locations could overlap with, and temporarily infringe on gathering of shellfish.	✓	✓	✓
Shipping and Navigation				
Recreational and commercial vessels	Interaction of Project vessels with commercial, fishing and recreational vessels	✓	✓	✓
Recreational and commercial vessels	Impacts on vessel routes	✓	✓	x
Recreational and commercial vessels	Displacement of anchorages	✓	✓	x
Recreational and commercial vessels	Impacts on navigational safety	✓	✓	**x**
Recreational and commercial vessels	Increased collision risk with other marine users	✓	✓	✓
Recreational and commercial vessels	Increased collision risk with Project devices	✓	✓	**x**
Search and Rescue	Impacts on emergency response resources	✓	✓	x
Recreational and commercial vessels	Interaction with subsea cables	✓	✓	x

Topic/Receptor	Potential Impact	C	O&M	D
Coastal and Marine Infrastructure and Other Users				
Disposal sites and Other Users	Risk of unexploded ordinance in a closed ammunitions dumps site if this is crossed by a potential export cable route, during installation, maintenance and possibly decommissioning.	x	x	x
Disposal sites	Risk of sedimentation plumes settling on potential cable routes (or vice versa) from disposal sites.	✓	✓	✓
Milford Haven Port	Installation and maintenance of export cable routes through the Milford Haven could present navigational issues to vessels.	x	x	x
Cables	Project activity (construction, maintenance and decommissioning) could interact with active and disused telecom cables in proximity to the PDZ.	✓	✓	✓
Cables	The planning and installation of the proposed Greenlink interconnector could be affected by this proposal. This could potentially incur Project delays.	✓	✓	✓
Cables and floating wind turbines	The planning and installation of the proposed Project Erebus Floating Wind Farm could be affected by this proposal. This could potentially incur Project delays.	✓	✓	✓
Military activity	Interference with MoD operations	x	✓	x
Aviation and radar				
Aircraft (commercial, private and military)	Increased collision risk	✓	✓	✓
Primary Surveillance Radar	Physical obstruction of radar installations and the generation of unwanted returns to radar.	✓	✓	✓
Aeronautical navigation aids and communication systems	Possibility of installations interfering with radio communication between Air Traffic Controllers and aircraft under their control.	✓	✓	✓
Offshore helicopter operations	Risk of interaction between search and rescue helicopter service in the UK, flying at low levels	✓	✓	✓
Archaeology and cultural heritage				
Buried Archaeological/ (Palaeo) Environmental Remains	Direct damage or destruction of archaeological remains within the footprint of the proposed Project.	✓	x	✓
Wrecks and Crashed Aircraft	Direct damage or destruction of remains within the footprint of the proposed Project.	✓	✓	✓
Marine and Intertidal Heritage Assets	Indirect impacts associated with changes to marine and coastal processes.	✓	✓	x
Heritage Assets	Impacts to the setting of heritage assets.	✓	✓	✓
Historic Landscape and Seascape	Changes to the historic character of the Study Area.	✓	✓	✓

Topic/Receptor	Potential Impact	C	O&M	D
Current Archaeological Research In Wales	Potential beneficial impact of published fieldwork results and archaeologically assessed geophysical and geotechnical data.	✓	x	x
Land use				
Settlements: existing and known future plans	No impacts predicted.	x	x	x
Business, Industry and Energy Generation: existing and known future plans	No impacts predicted.	x	x	x
Unknown future development	Installation and long-term presence of onshore cables could affect future development; land 'sterilisation'.	✓	✓	✓
National Park (All Landfall Options)	Installation and long-term presence of landfall site infrastructure, substation and onshore cables within National Park, affecting use and management of the land.	x	x	x
Military (Bullslaughter Bay, New Quay Beach, Greenala Point, Freshwater East, Broadhaven South Landfall Options)	Installation and long-term presence of below ground and above ground infrastructure restricting MoD training activities.	x	x	x
Agriculture	Installation and long-term presence of onshore cabling across farm land. Temporary loss of land during construction; reduced quality of land after reinstatement; permanent loss of farmable land to footprint of belowground easements or overhead transmission line pylons.	✓	✓	✓
Traffic and Transport				
Road users and local communities	Highway Safety	✓	x	✓
Local communities	Pedestrian Amenity	✓	x	✓
Local communities	Severance	✓	x	✓
Road users and local communities	Driver Delay	✓	x	✓
Other road users and local communities	Abnormal Loads	✓	x	✓
Landscape, Seascape and Visual Impacts – Landscape and Seascape				

Topic/Receptor	Potential Impact	C	O&M	D
Landscape character of the PCNP and the Special Qualities for which it was designated	Physical presence of work activities and infrastructure, both offshore and onshore, affecting the landscape character	✓	✓	✓
Character of Registered Landscapes of Outstanding or Special Interest: Milford Haven Waterway; Stackpole Warren; and Manorbier	Onshore cable laying and substations, if required, may affect the landscape character.	✓	✓	✓
MCAs 21-23 of the National Seascape Assessment for Wales (NRW)	Physical presence of construction works and offshore infrastructure may affect the seascape character.	✓	✓	✓
SCAs 29-30 and 34-37 of PCNPA Seascape Character Assessment	Physical presence of construction works and offshore infrastructure may affect the seascape character.	✓	✓	✓
LCAs 4-8 of the PCNPA Landscape Character Assessment	Cable laying and substations (onshore and offshore) may affect the landscape and seascape character.	✓	✓	✓
Character of LANDMAP aspect areas	Cable laying and substations (onshore and offshore) may affect the landscape and seascape character.	✓	✓	✓
Character of Portclew Conservation Area	Onshore cable laying may affect the landscape character.	✓	x	✓
Character of South Pembrokeshire Heritage Coast	Cable laying and substations (onshore and offshore) may affect the landscape and seascape character.	✓	✓	✓
Character of Stackpole Court Historic Park and Garden	Onshore cable laying may affect the landscape character.	✓	x	✓
Landscape, Seascape and Visual Impacts – Visual Amenity				
Visitors to Pembrokeshire Coast National Park including users of the Pembrokeshire Coast Path and other PRoWs	Works and infrastructure affecting the views of PRoW users	✓	✓	✓
Visitors to coastal heritage assets, beaches and other outdoor recreational activities	Works and infrastructure affecting the views of coastal recreation users	✓	✓	✓

Topic/Receptor	Potential Impact	C	O&M	D
Local residents within Pembrokeshire	Works and infrastructure affecting the views of Pembrokeshire residents	✓	✓	✓
Passengers on boats	Offshore works and infrastructure affecting the views of boat passengers	✓	✓	✓
Underwater Noise and Vibration				
Ecological Receptors	Physical injury and disturbance	✓	✓	✓
Onshore Noise and Vibration				
Ecological receptors	Disturbance to behaviour patterns during construction phase.	x	x	x
Human receptors	Temporary increases in noise and vibration levels leading to annoyance and/or adverse health effects	✓	✓	✓
Buildings	Temporary increases in ground-borne vibration leading to building damage	✓	x	✓
Air Quality				
Human receptors	Dust soiling and transfer of mud and dirt onto the public highway (trackout)	✓	x	✓
	Human health impacts from dust, fine particulate matter	✓	x	✓
	Human health impacts from road vehicle emissions.	✓	x	✓
Ecological receptors	Impacts from dust and fine particulate matter and from the transfer of mud and dirt onto the public highway (trackout)	✓	x	✓
	Ecological impacts from road vehicle emissions.	✓	x	✓
Tourism and Recreation (Offshore)				
Recreational boating (incl. sea angling and diving boats)	Obstruction to regular vessel routes	✓	✓	✓
Recreational boating (incl. sea angling and diving boats)	Increased risk of vessel collision either with PDZ infrastructure or due to displacement	✓	✓	✓
Sea angling (private and charter vessels)	Effects on spawning areas, or migration patterns, thus impacting on abundance of target species	✓	✓	✓
Divers	Obstruction and safety risks to divers operating in proximity to infrastructure	✓	x	✓
Recreational boating (incl. sea angling and diving boats)	Risk of interference with recreational vessel communications, radar and positioning systems	x	x	x
Tourism and Recreation (Coastal and Terrestrial)				
Beach users at Freshwater West, Bullslaughter Bay	Obstruction and disturbance	✓	x	✓

Topic/Receptor	Potential Impact	C	O&M	D
Beach users at Broad Haven South and Freshwater East	Obstruction and disturbance	✓	x	✓
Walkers, cyclists and car users	Obstruction and disturbance	✓	x	✓
Recreation and tourism service providers	Obstruction and disturbance	✓	x	✓
Recreation and tourism service providers	Increased business and bookings for retail and accommodation providers.	✓	x	✓
Pembrokeshire Coastal Path	Visual impacts of PDZ infrastructure on coastal walkers seeking uninterrupted sea views	x	✓	x
Socio-economics				
Aging Population	Help to decrease proportion of population that is no longer economically active.	✓	✓	✓
Economically Active and Employment	Help to increase proportion of population in economically active age range who are in employment. Will help to narrow the gap with Wales and UK averages.	✓	✓	✓
Employment by Occupation	Help to reverse trends in employment by occupation. Pembrokeshire has experienced a greater decline in all occupations other than ‘professional occupations’, ‘process, plant and machine operatives’ compared to Wales and UK.	✓	✓	✓
Business Enterprises by Industry	Reduce a decline in ‘financial and business services’ and ‘Private sector health and education’ in recent years. Boost enterprises in ‘Production’.	✓	✓	✓
GVA and Productivity	Improve GVA per head in relation to Wales and UK averages.	✓	✓	✓
Wales’ 10% Most Deprived Areas	Increase opportunities for very deprived areas in Pembrokeshire.	✓	✓	✓

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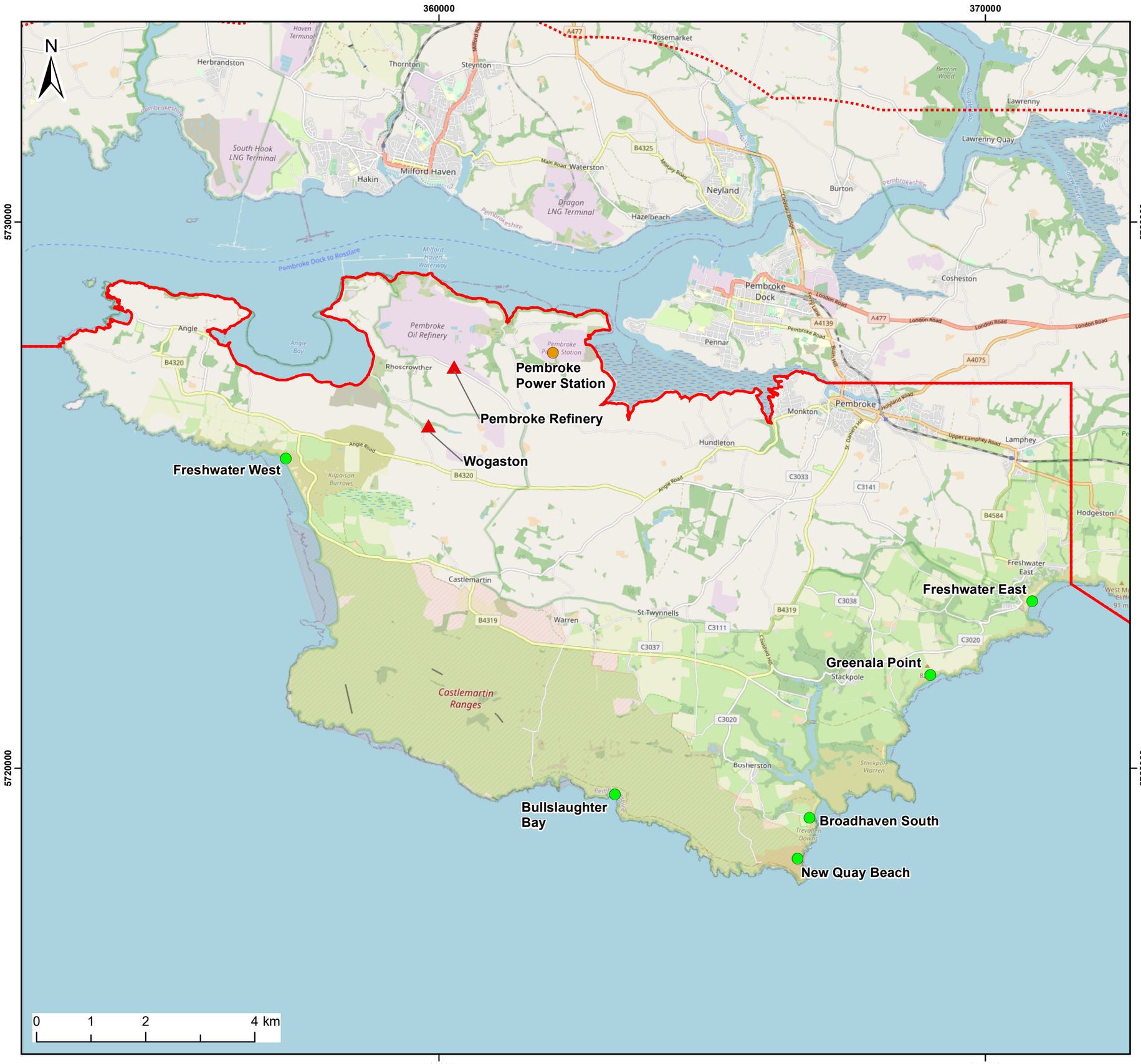
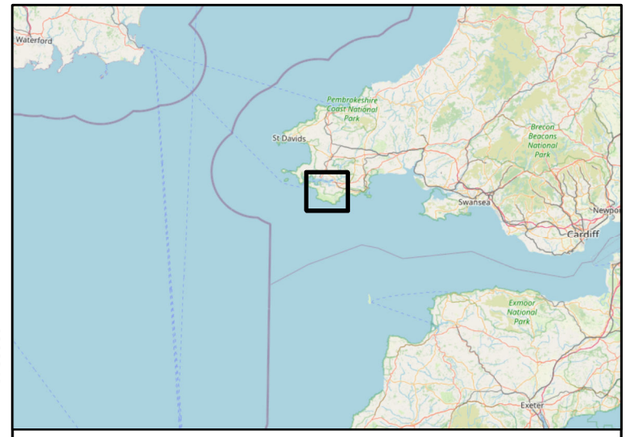
Appendix A Figures





Legend:

- Project Area
- Project Area 5km Buffer
- Proposed Landfall Options
- Onshore Connection Point
- Permitted Waste Sites

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Permitted Waste Sites Within Project Area

Figure:	Drawing No:
A5.3.1	PC3562-RHD-ZZ-ZZ-DR-Z-0031

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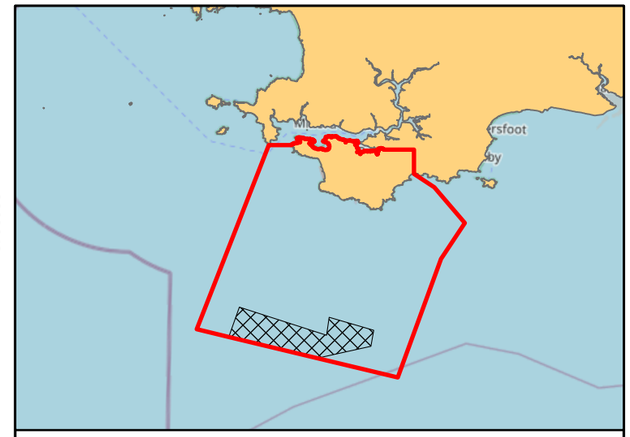

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Water Framework Directive

- WFD Rivers
- WFD Coastal
- WFD Transitional
- WFD River Catchments
- WFD Groundwaters

WFD Lake

- Boshteron Lily Ponds (Central Arm)
- Boshteron Lily Ponds (Eastern Arm)
- Boshteron Lily Ponds (Western Arm and Central)

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

WFD Water Bodies

Figure: A5.5.1 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0002

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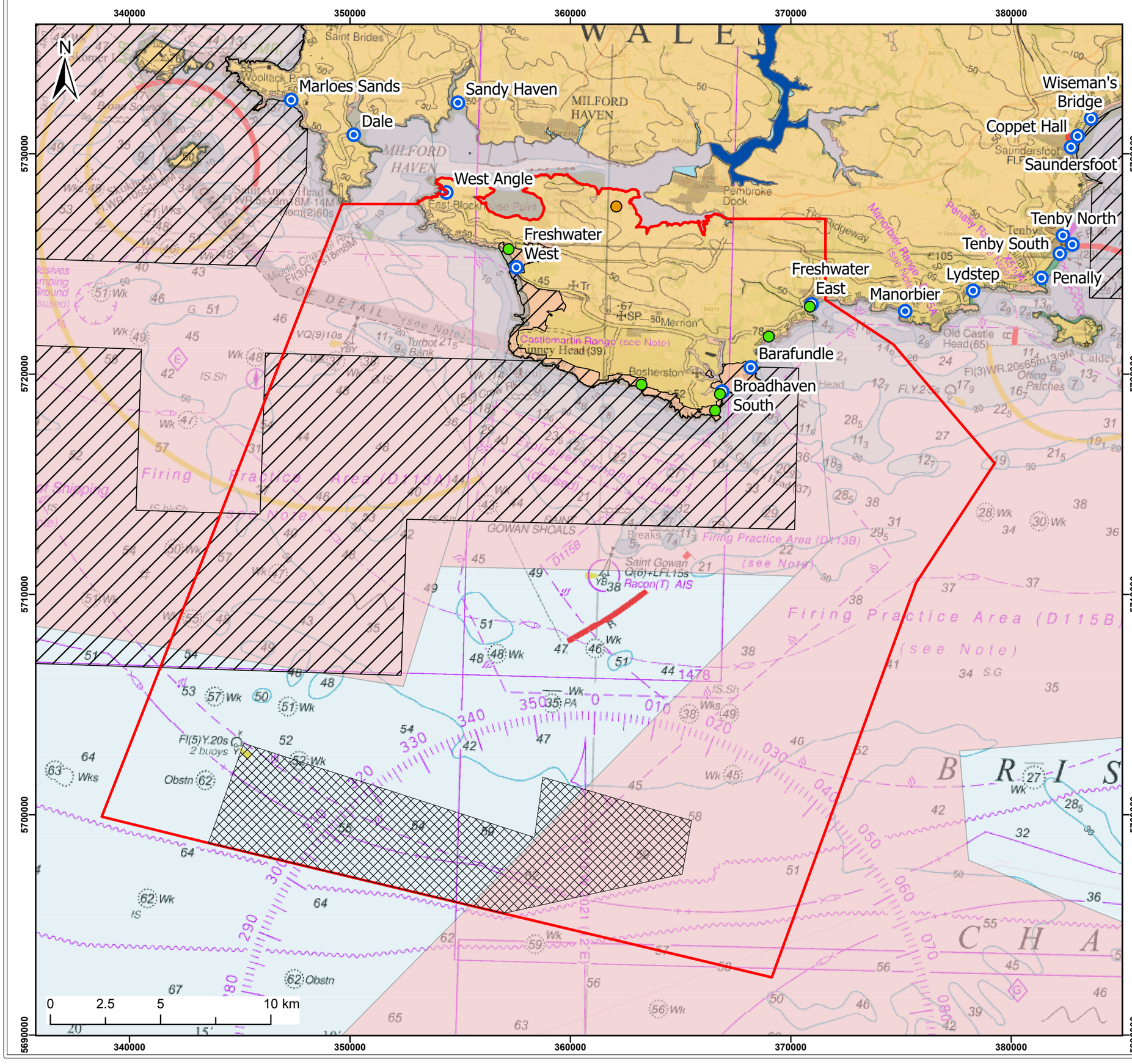

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station
- Bathing Water Compliance
- SAC Wales
- SPA Wales
- Shellfish Waters

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: WFD Protected Areas

Figure: A5.5.2 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0003

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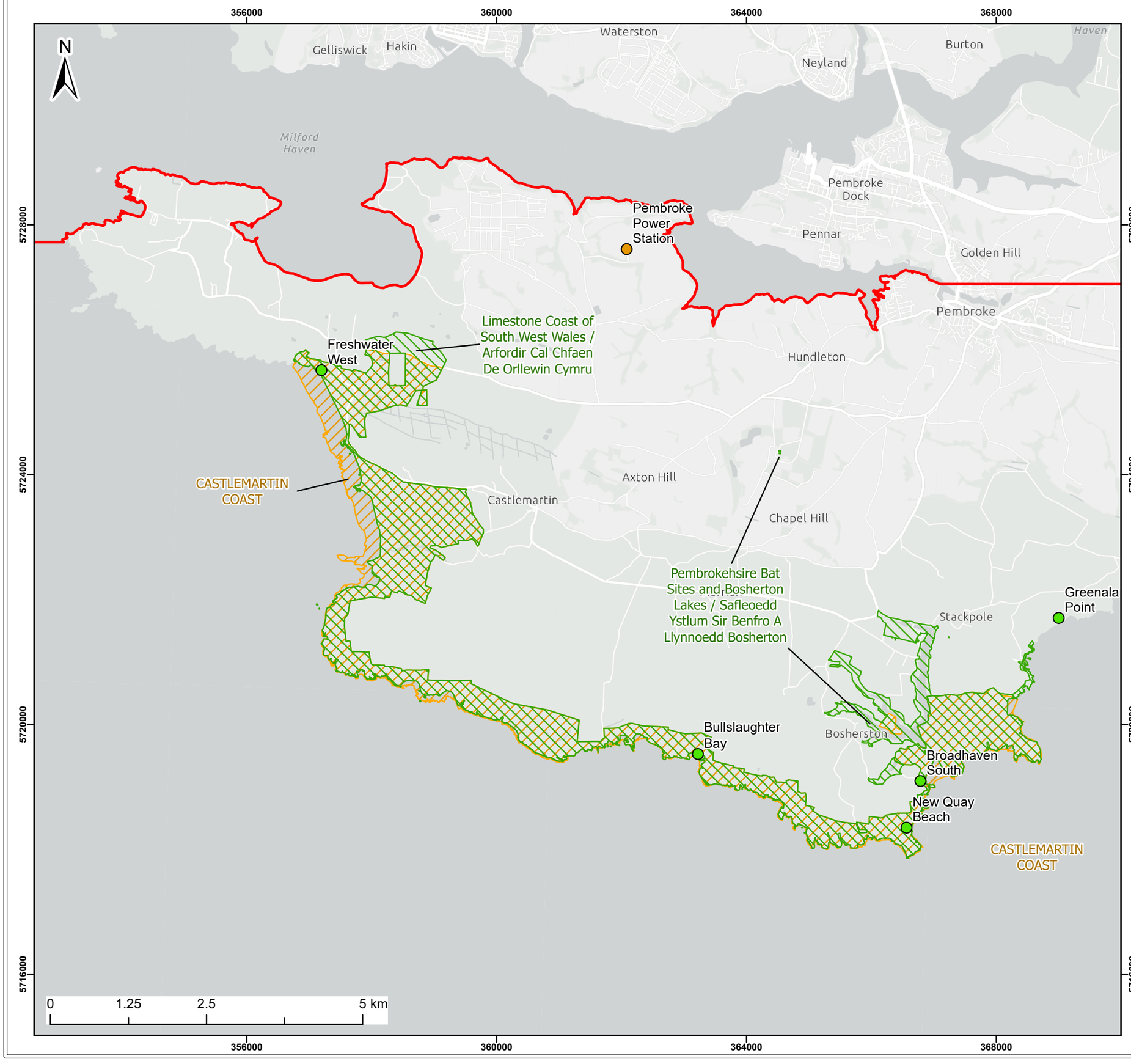

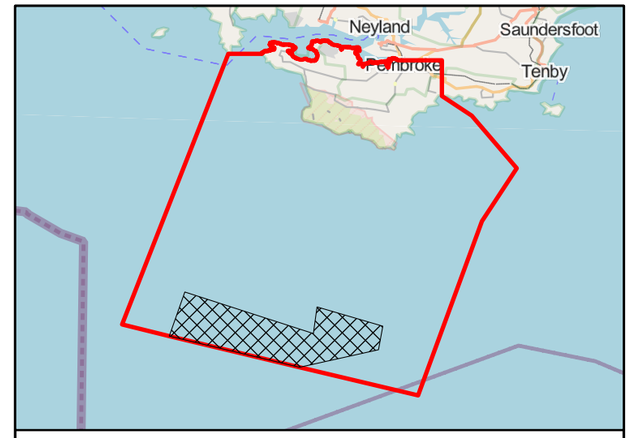

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station
- Special Aras of Conservation
- Special Protection Areas

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Internationally Designated Sites on the Castlemartin Peninsula

Figure:	Drawing No:
A6.1.1	PC3562-RHD-ZZ-ZZ-DR-Z-0004

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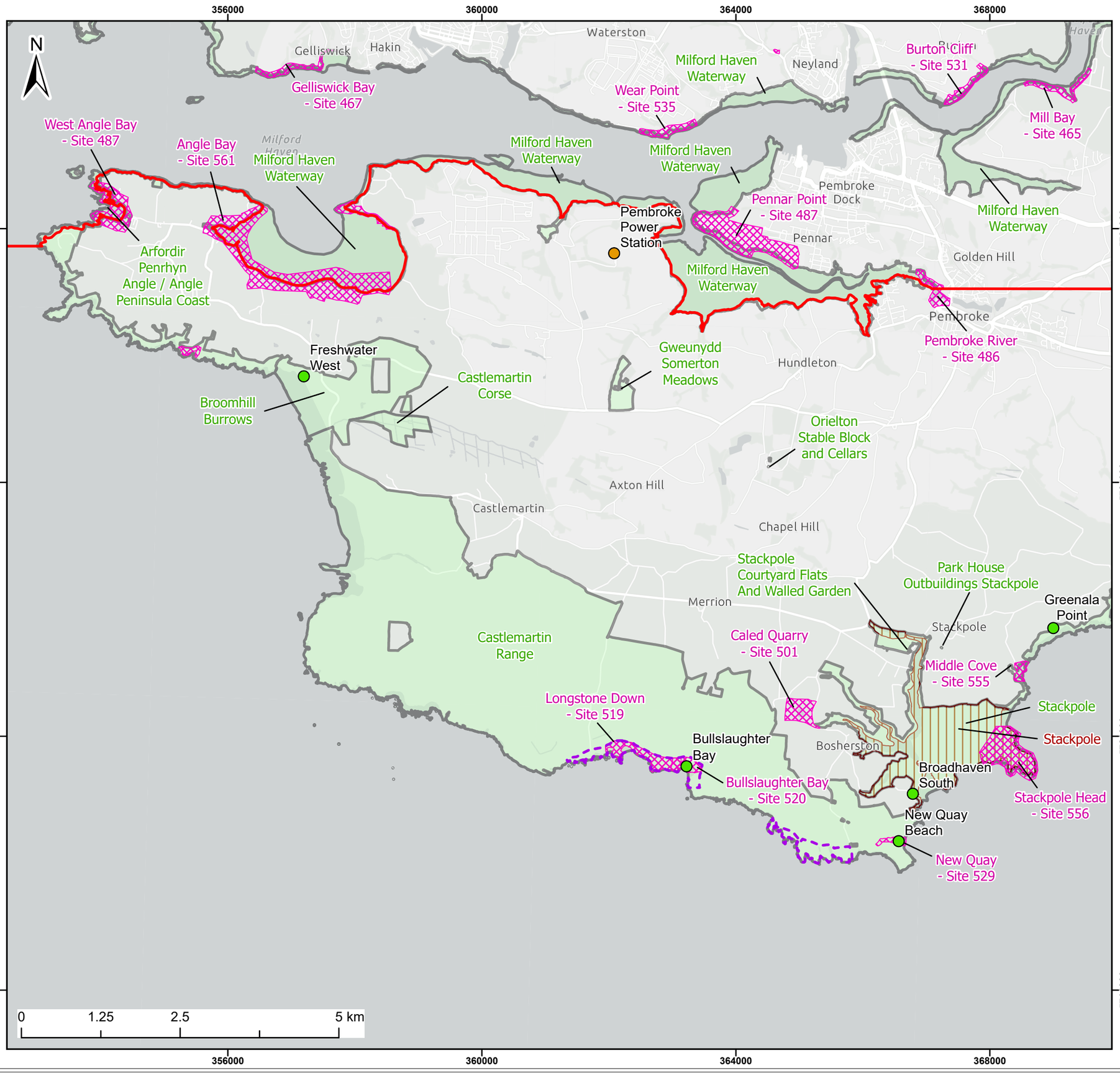

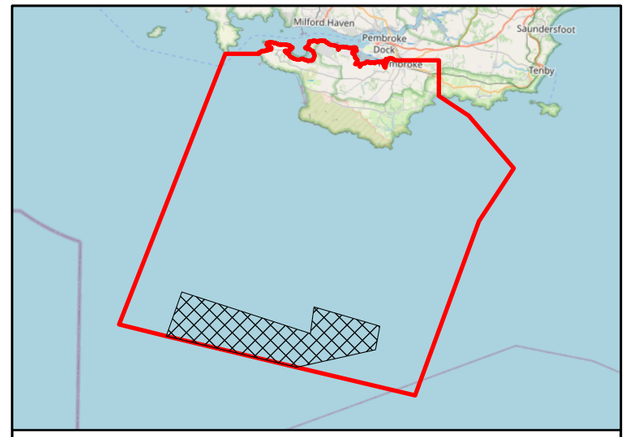

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station
- National Nature Reserve
- Site of Special Scientific Interest
- Regionally Important Geodiversity Sites (RIGS)
- South Pembroke Cliffs Geological Conservation Review (GCR) Site

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Nationally Designated Sites on the Castlemartin Peninsula

Figure:	Drawing No:
A6.1.2	PC3562-RHD-ZZ-ZZ-DR-Z-0005

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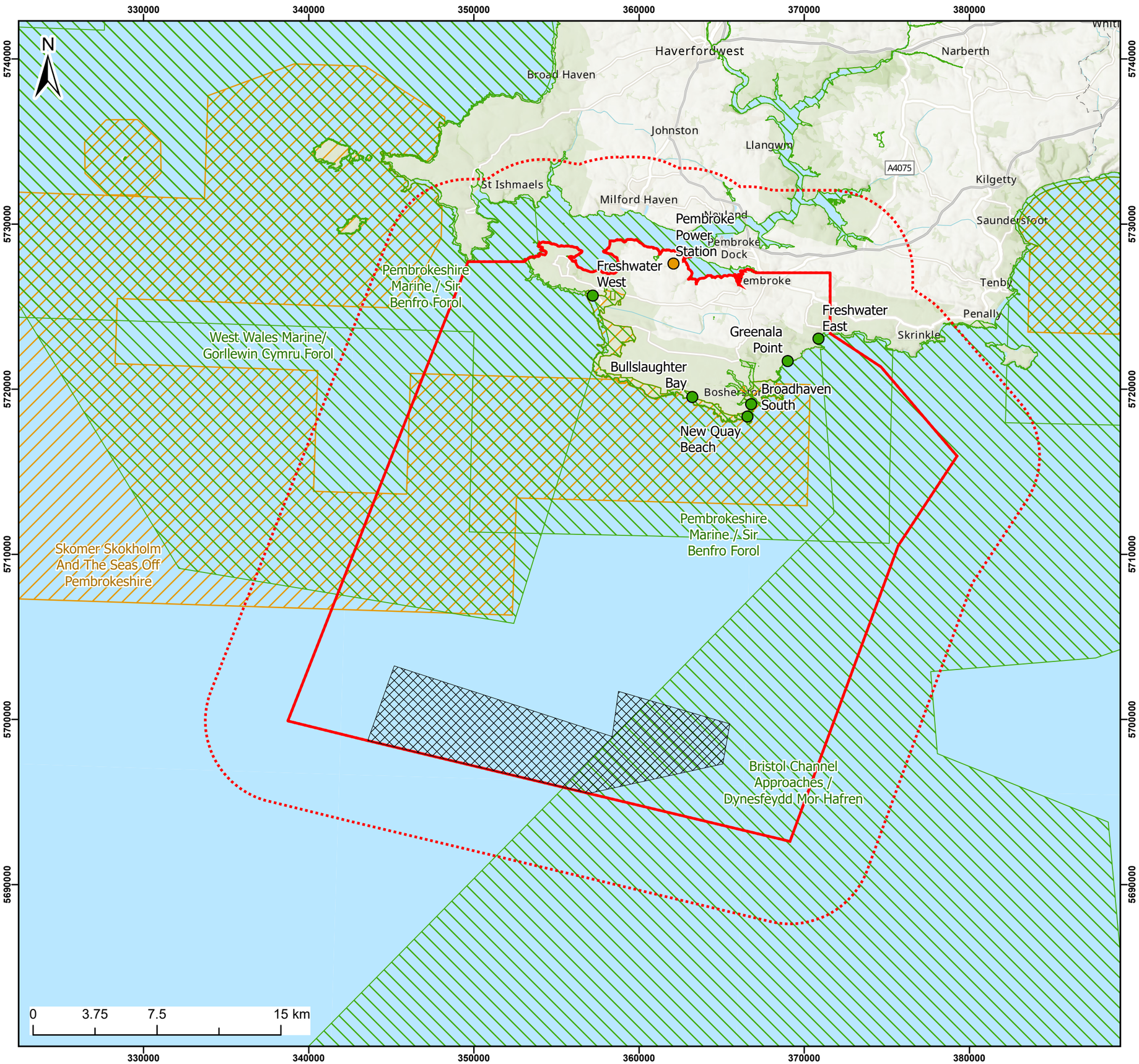

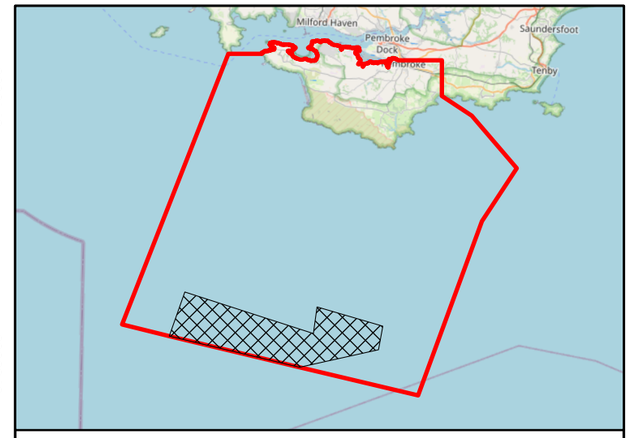

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Project Area 5km Buffer
- Landfall Site Options
- Pembroke Power Station
- Special Area of Conservation
- Special Protection Area

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Internationally Designated Coastal and Marine Sites Within 5KM of Project Area

Figure:	Drawing No:
A6.1.3	PC3562-RHD-ZZ-ZZ-DR-Z-0006

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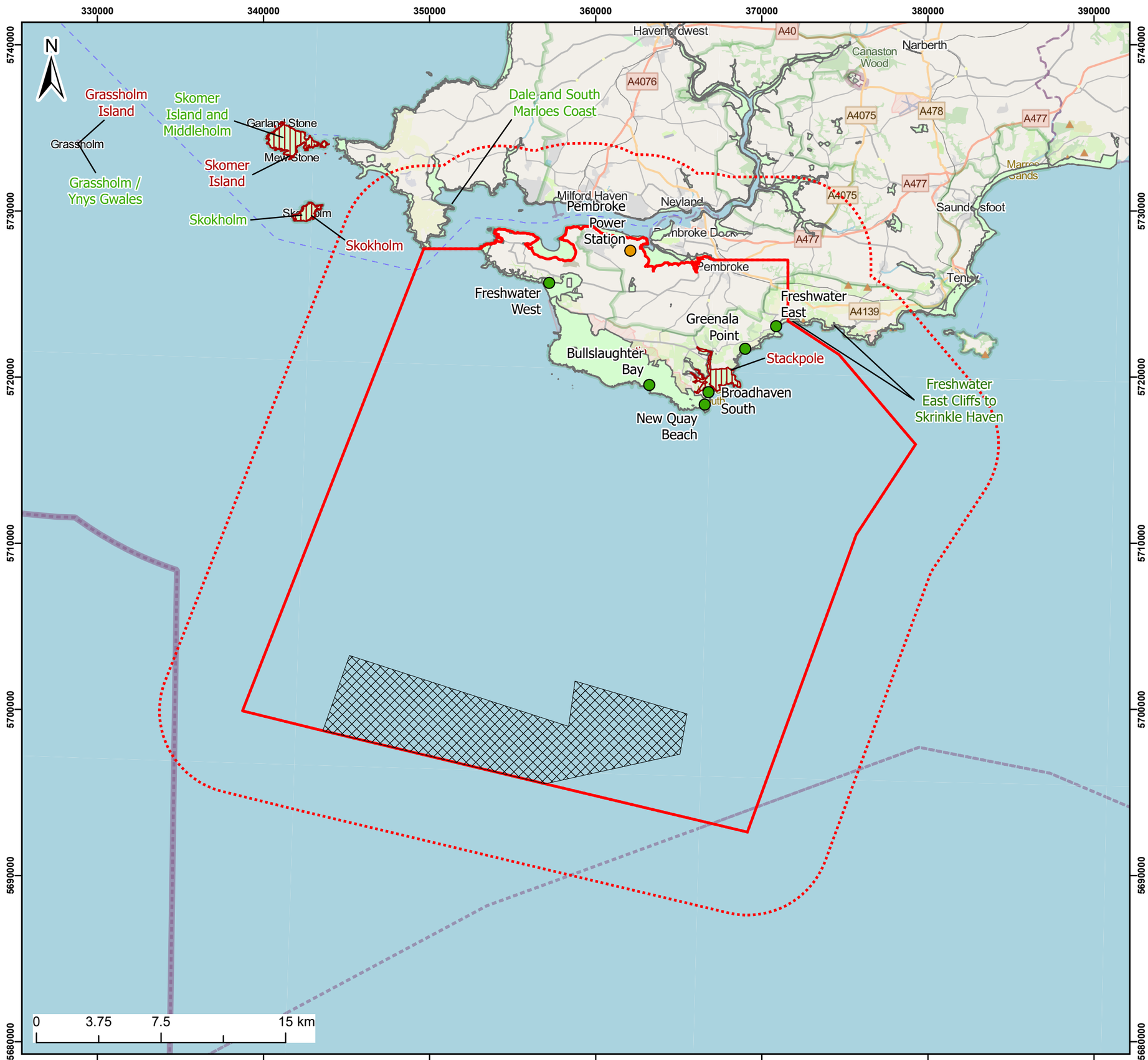

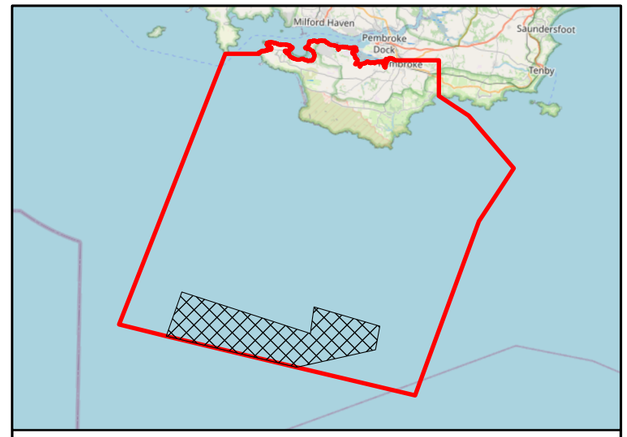

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Project Area 5km Buffer
- Landfall Site Options
- Pembroke Power Station
- National Nature Reserves
- Sites of Special Scientific Interest

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Nationally Designated Coastal and Marine Sites Within 5km of Project Area

Figure:	Drawing No:
A6.1.4	PC3562-RHD-ZZ-ZZ-DR-Z-0007

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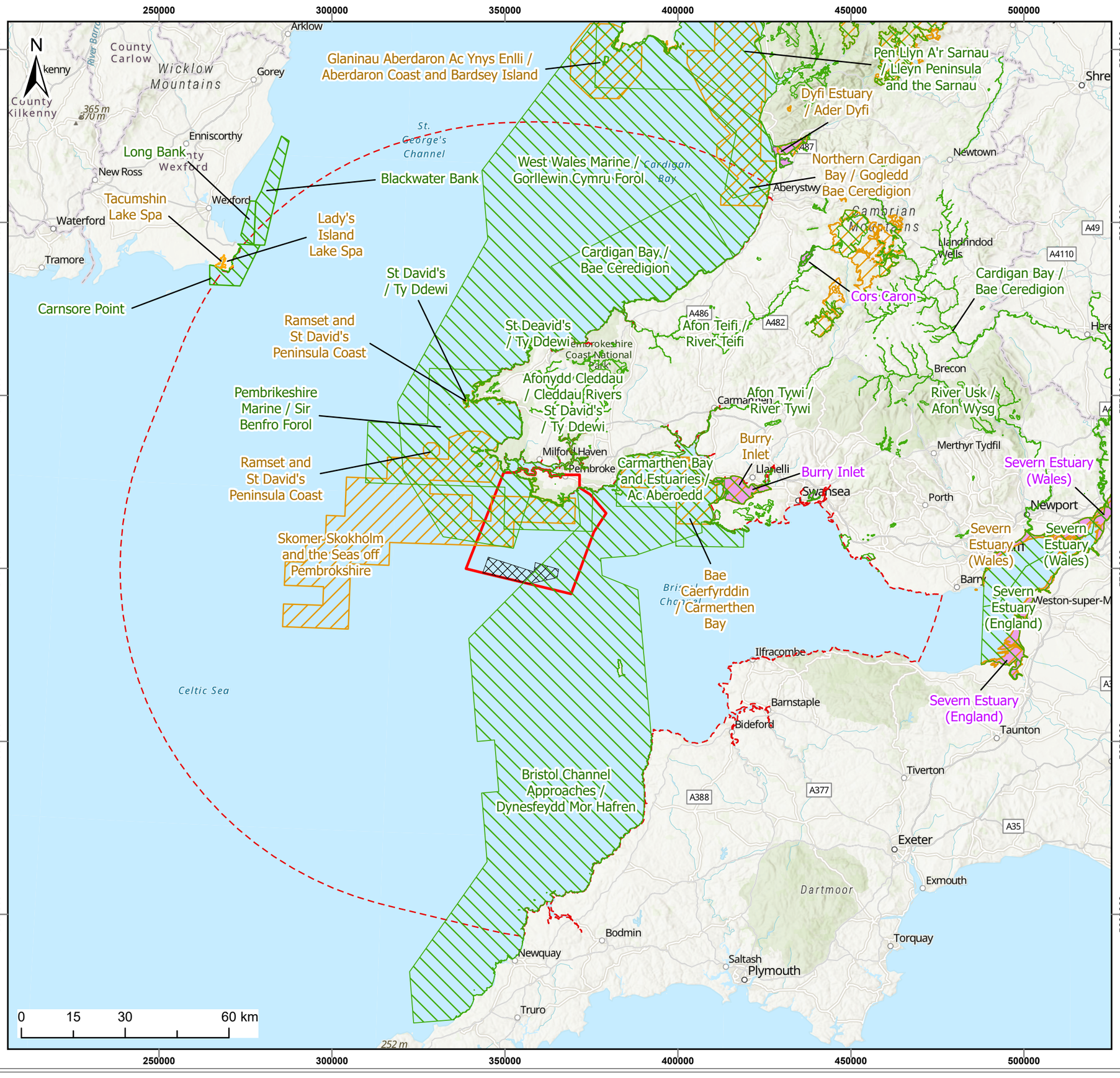

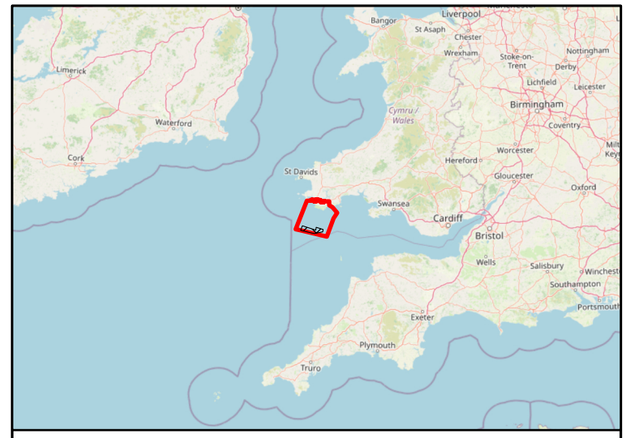

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Project Area 100km Buffer
- Special Protection Area
- Special Area of Conservation
- Ramsar Site

Client: Celtic Sea Power Ltd	Project: Pembrokeshire Demonstration Zone

Title: Internationally Designated Coastal and Marine Sites Within 100KM of Project Area

Figure: A6.1.5 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0008

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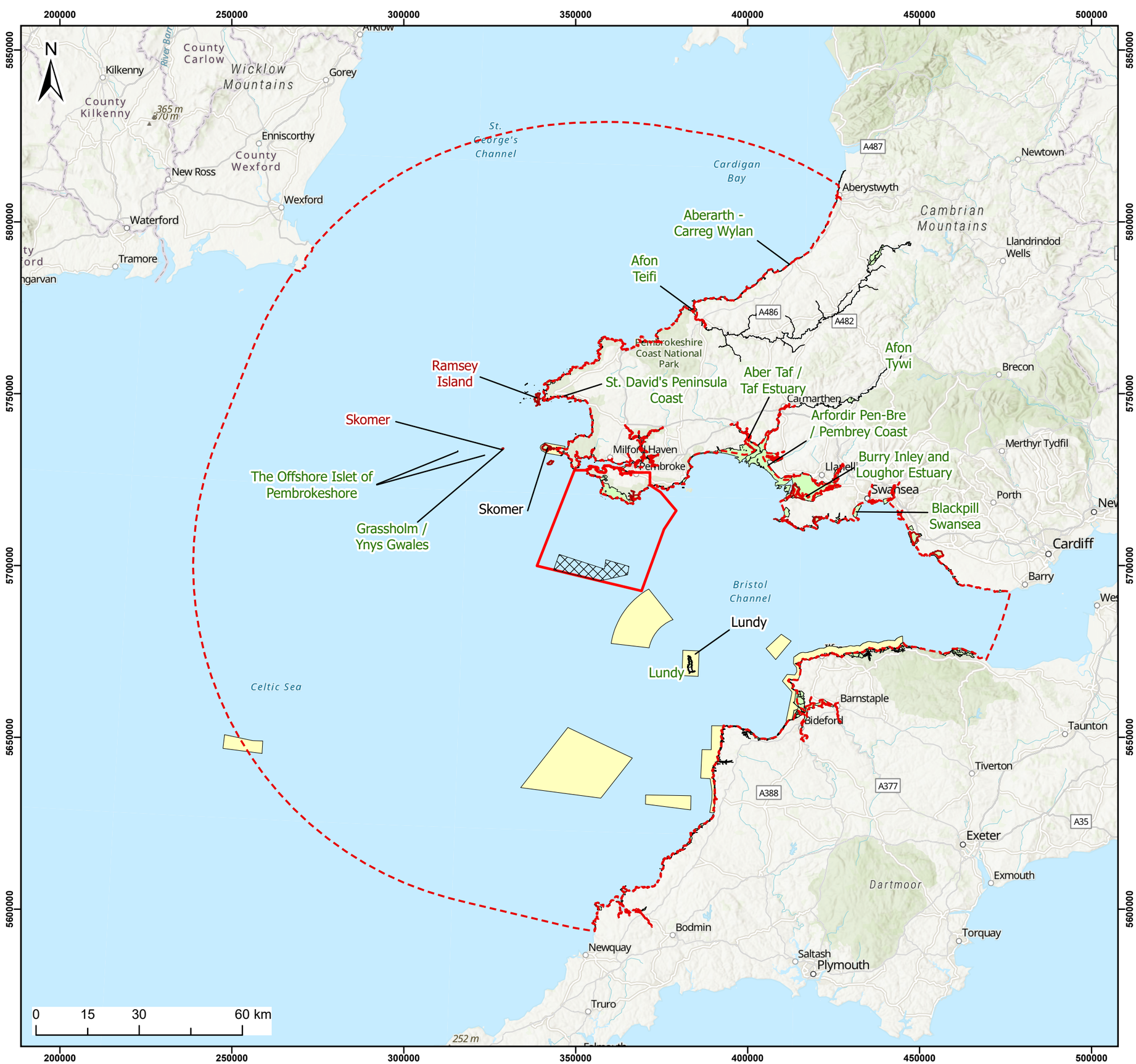

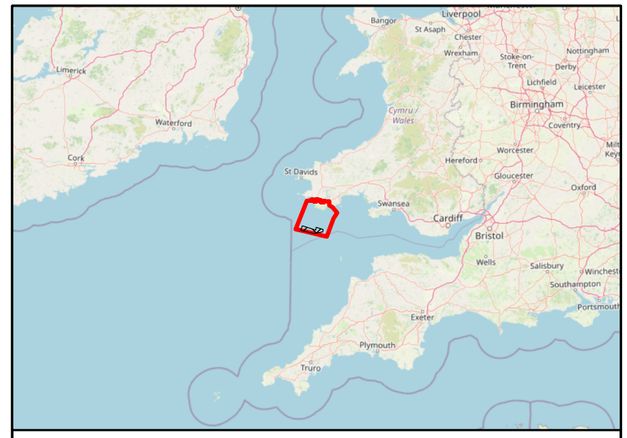

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Project Area 100km Buffer
- National Nature Reserve
- Sites of Special Scientific Interest
- Marine Conservation Zones

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Nationally Designated Coastal and Marine Sites Within 100KM of Project Area

Figure: A6.1.6 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0009

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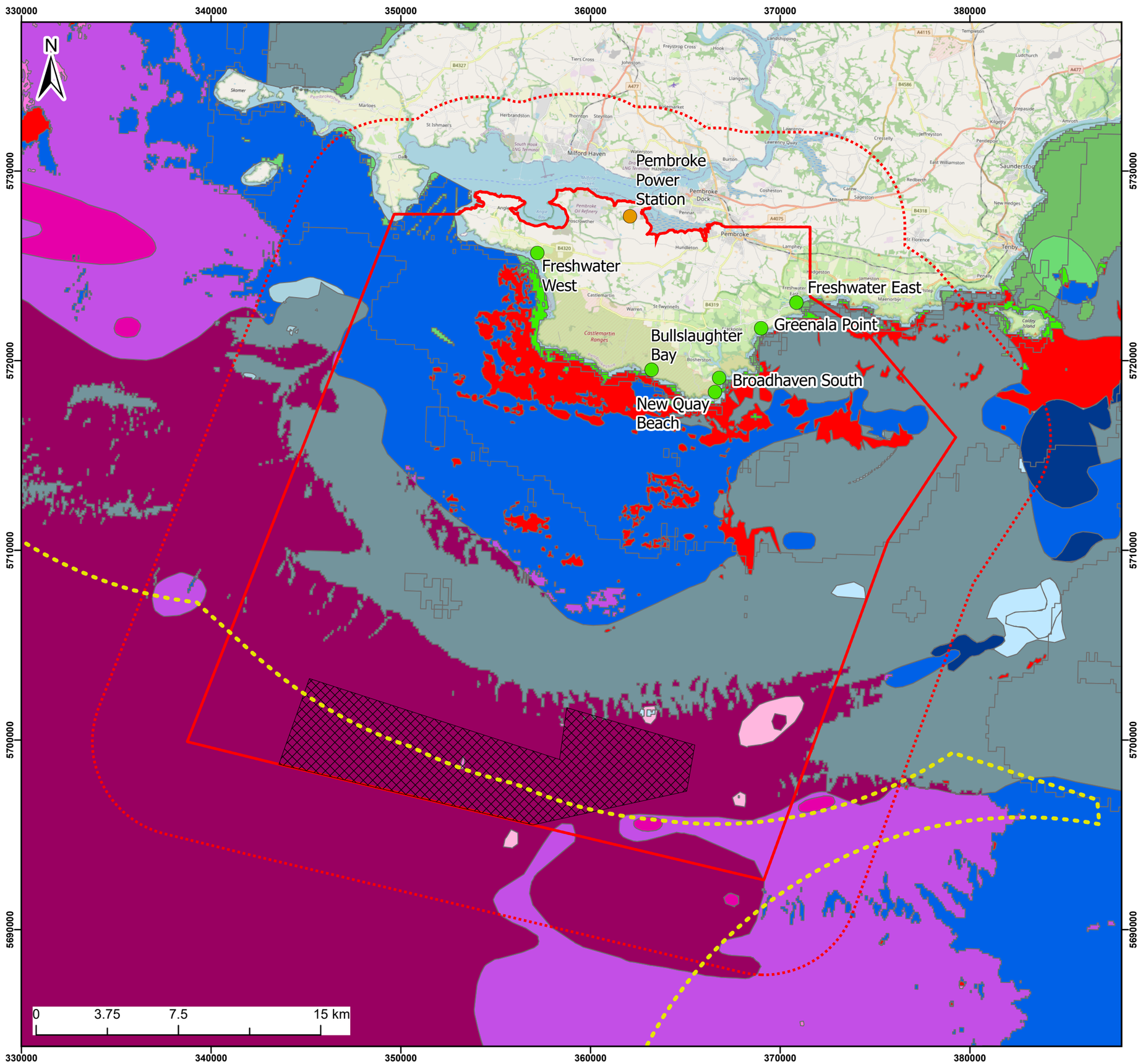

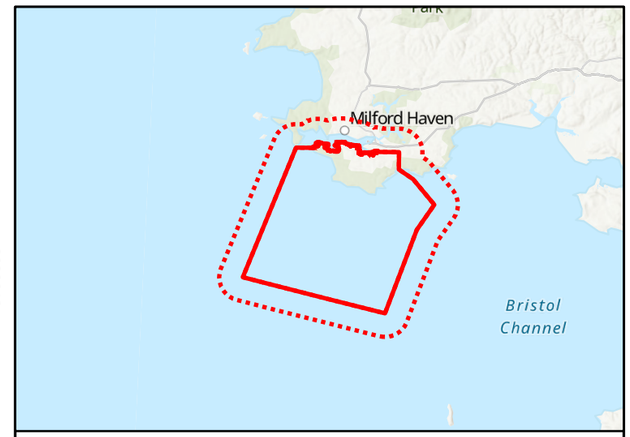

Legend:

- Project Area
- Project Area 5km Buffer
- 12NM Limit
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Onshore Connection Point

MSFD_BH17

- Circalittoral coarse sediment
- Circalittoral mixed sediment
- Circalittoral mud
- Circalittoral rock and biogenic reef
- Circalittoral sand
- Infralittoral coarse sediment
- Infralittoral rock and biogenic reef
- Infralittoral sand
- Offshore circalittoral coarse sediment
- Offshore circalittoral mixed sediment
- Offshore circalittoral mud
- Offshore circalittoral rock and biogenic reef
- Offshore circalittoral sand

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Eunis Broadscale Habitats Map (2007 - 2011)

Figure:	Drawing No:
A6.2.1	PC3562-RHD-ZZ-ZZ-DR-Z-0010

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5730000 5720000 5710000 5700000 5690000

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Middleholm Bank

Martin's Haven Bank

The Knoll

Pembroke Power Station

Freshwater West

Turbot Bank

Freshwater East

Greenala Point

Bullslaughter Bay

Broadhaven South

New Quay Beach

St Gowan Shoals

0 3 6 12 km

Legend:

- Project Area
- Project Area 5km Buffer
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Pembroke Power Station

UK Reefs

- High Confidence
- Potential
- Bedrock
- Stony

UK Sandbanks

- High
- Potential

- Submerged or Partially Submerged Sea Caves
- 12NM Limit

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Annex I Habitats (JNCC 2016)

Figure: A6.2.2 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0012

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	09/01/2023	ND	XX	A3	1:210,000

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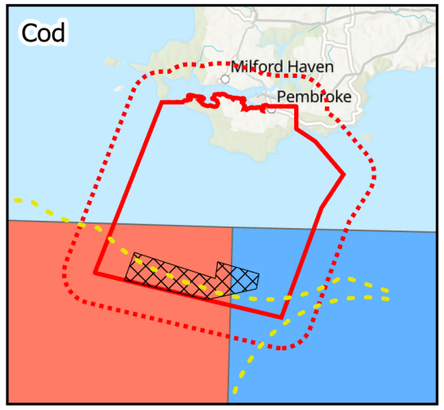
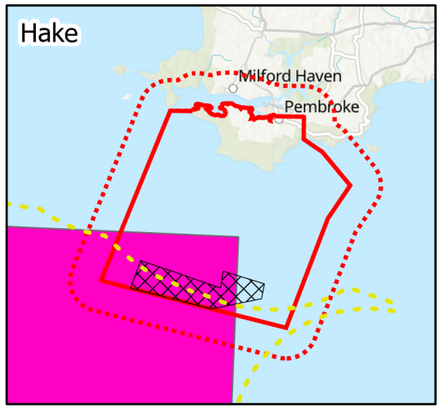
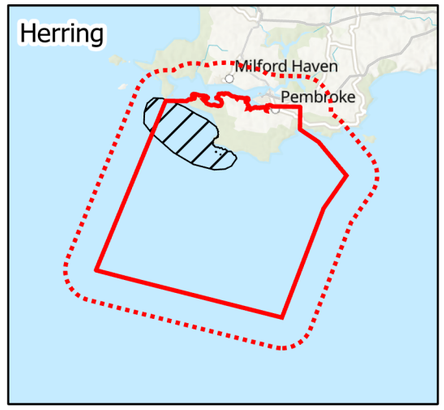
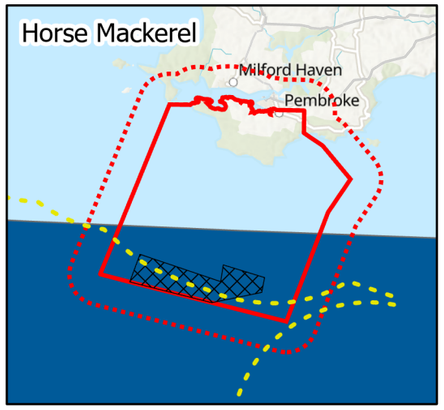
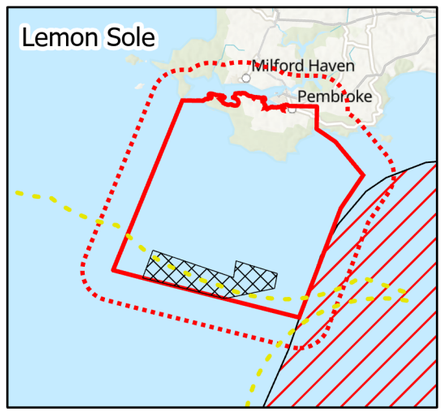
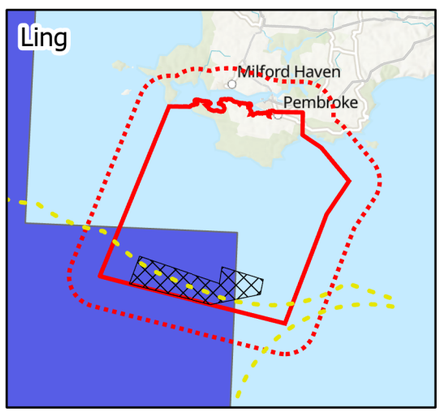


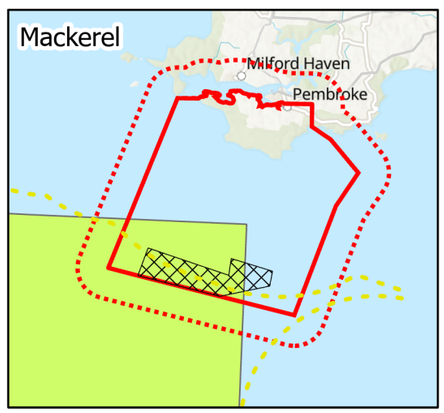


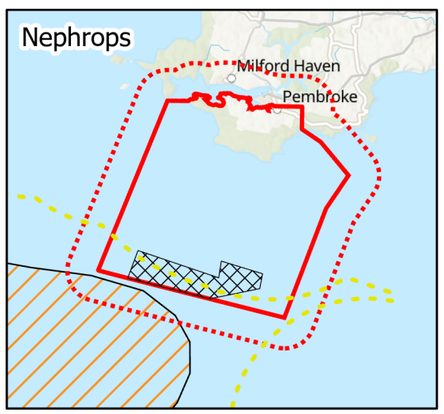


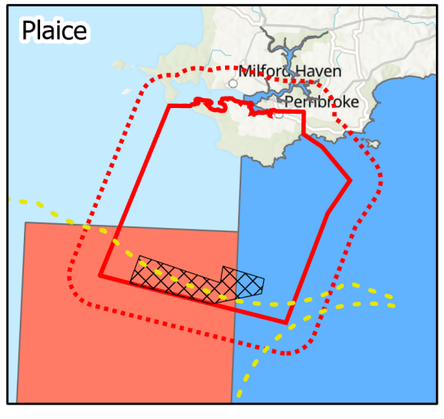


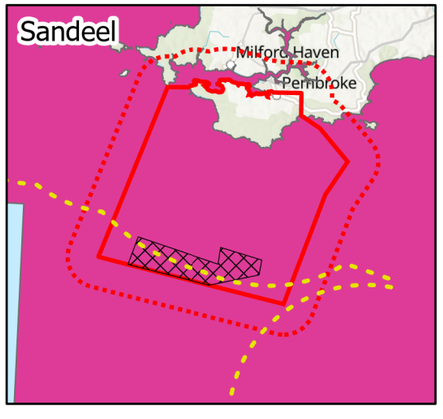


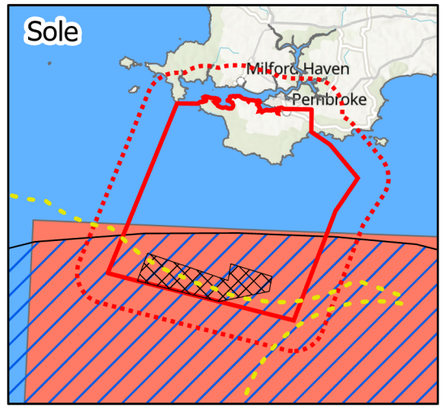


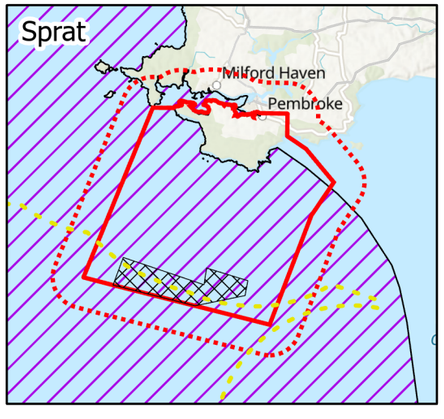


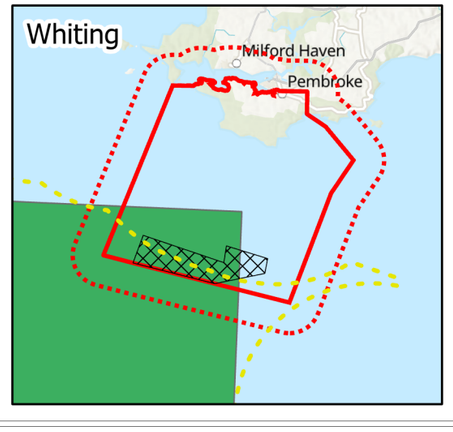




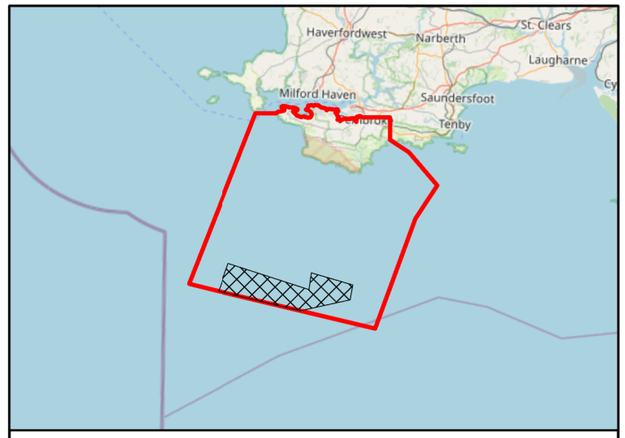








0 12.5 25 50 km



Legend:

- Project Area
- Project Area 5km Buffer
- 12NM Limit
- Pembrokeshire Demonstration Zone Area

Spawning Grounds 2010

- Hake
- Horse Mackerel
- Ling
- Mackerel
- Sandeel
- Whiting

Spawning Grounds 1998

- Herring
- Lemon Sole
- Nephrops
- Plaice
- Sole
- Sprat

Cod, Plaice and Sole

- High Intensity
- Low Intensity

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Fish Spawning Grounds

Figure: A6.3.1 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0013

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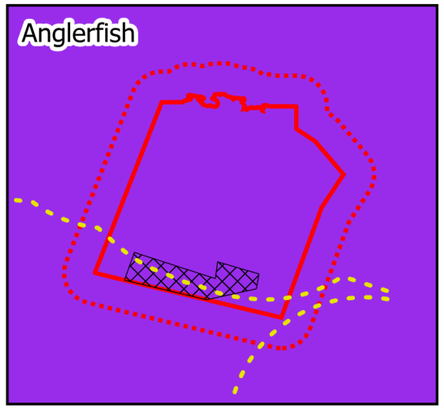
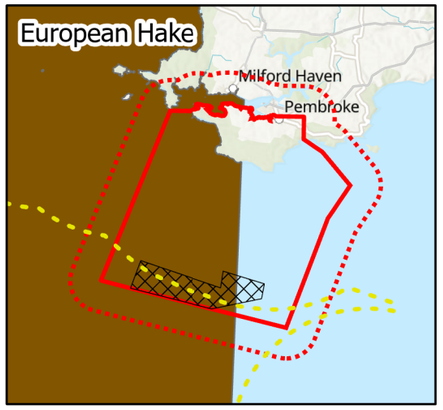
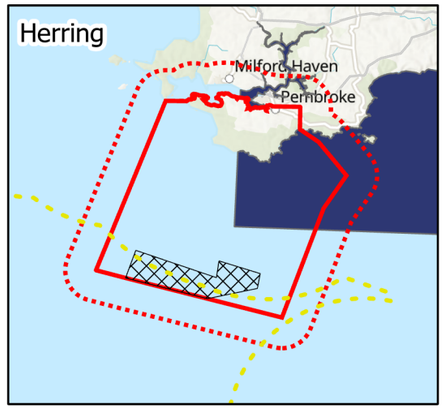
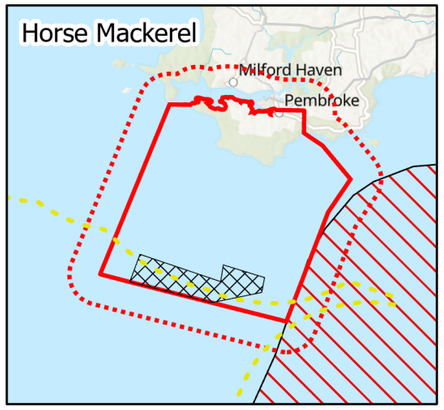
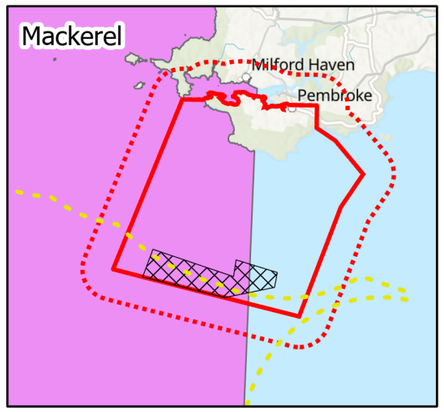
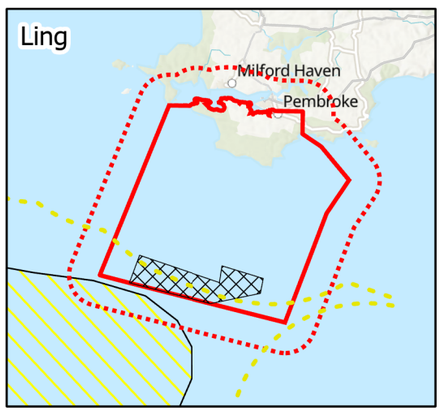


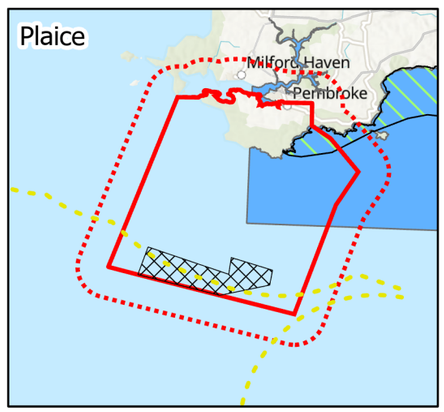


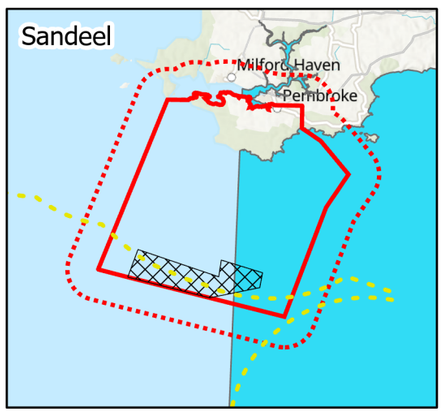


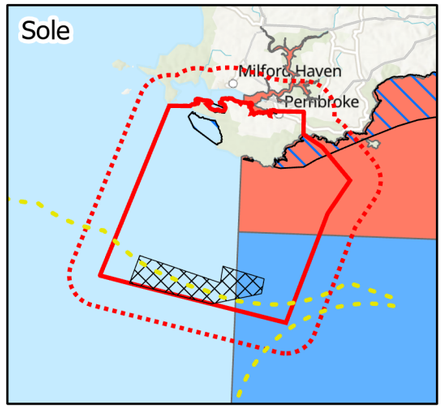


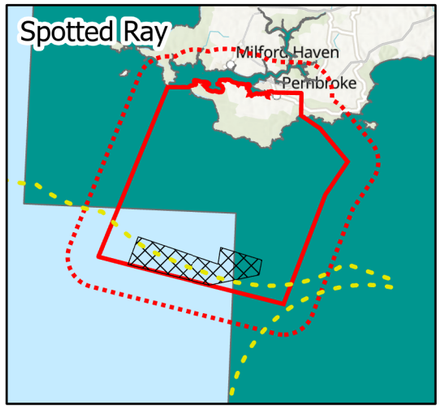


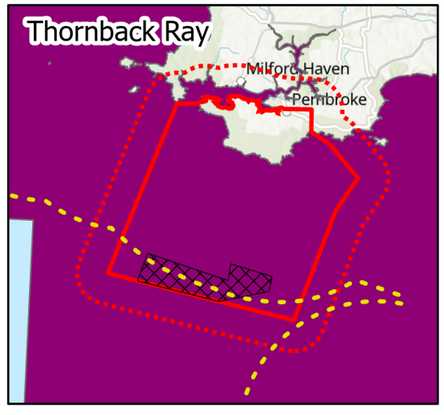


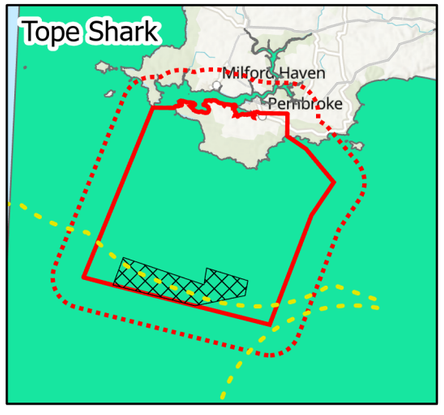


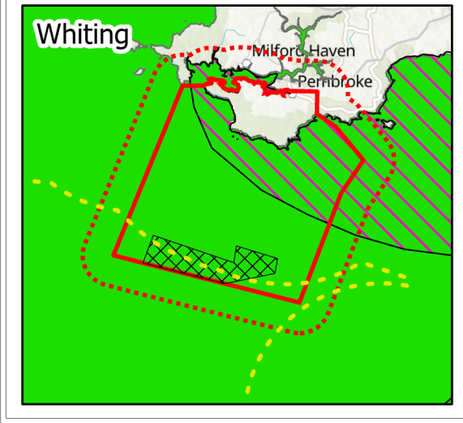




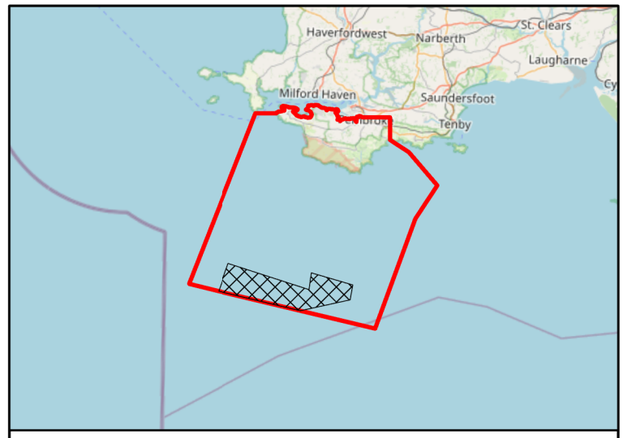








0 12.5 25 50 km



Legend:

- Project Area
- Project Area 5km Buffer
- 12NM Limit
- Pembrokeshire Demonstration Zone Area

Nursery Grounds 2010

- Anglerfish
- European hake
- Herring
- Mackerel
- Sandeel
- Spotted ray
- Thornback ray
- Tope shark
- Whiting

Nursery Grounds 1998

- Lemon Sole
- Nephrops
- Plaice
- Sole
- Whiting

Plaice and Sole

- High Intensity
- Low Intensity

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Fish Nursery Grounds

Figure: A6.3.2 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0014

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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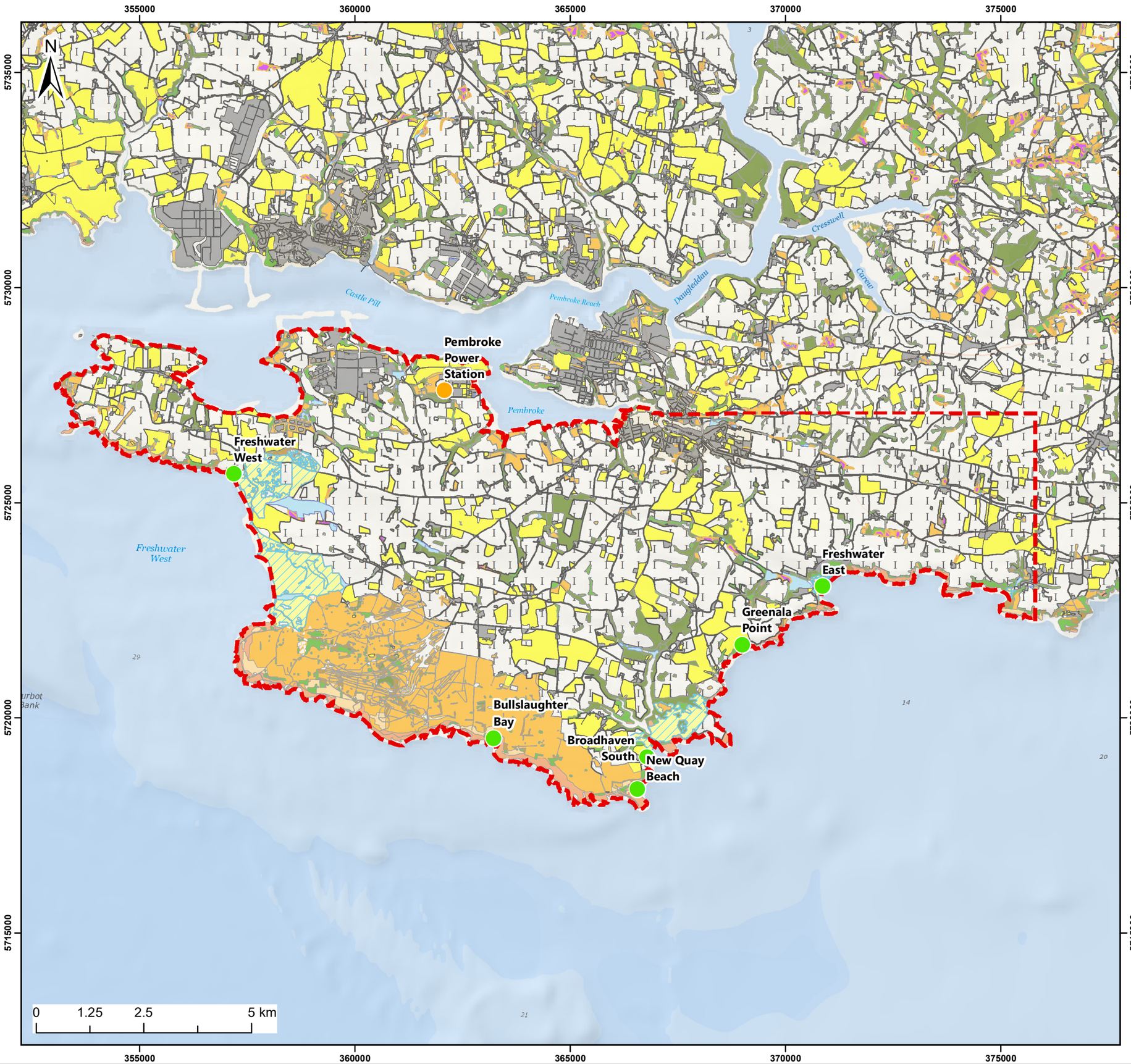

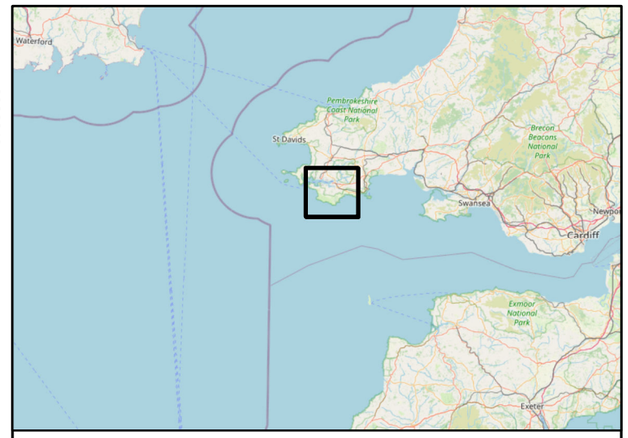

Legend:

- Terrestrial Ecology Study Area
- Landfall Site Options
- Pembroke Power Station

Phase 1 Habitat Survey for Wales

- Woodland (All types)
- Scrub
- Neutral Grassland
- Calcareous Grassland
- Improved Grassland
- Marshy Grassland
- Bracken
- Swamp & Fen
- Sand Dunes (All types)
- Maritime Cliff
- Seacliff Heath
- Cultivated Land
- Buildings

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Principal Terrestrial Habitats of Castlemartin Peninsula

Figure:	Drawing No:
A5.3.1	PC3562-RHD-ZZ-ZZ-DR-Z-0011

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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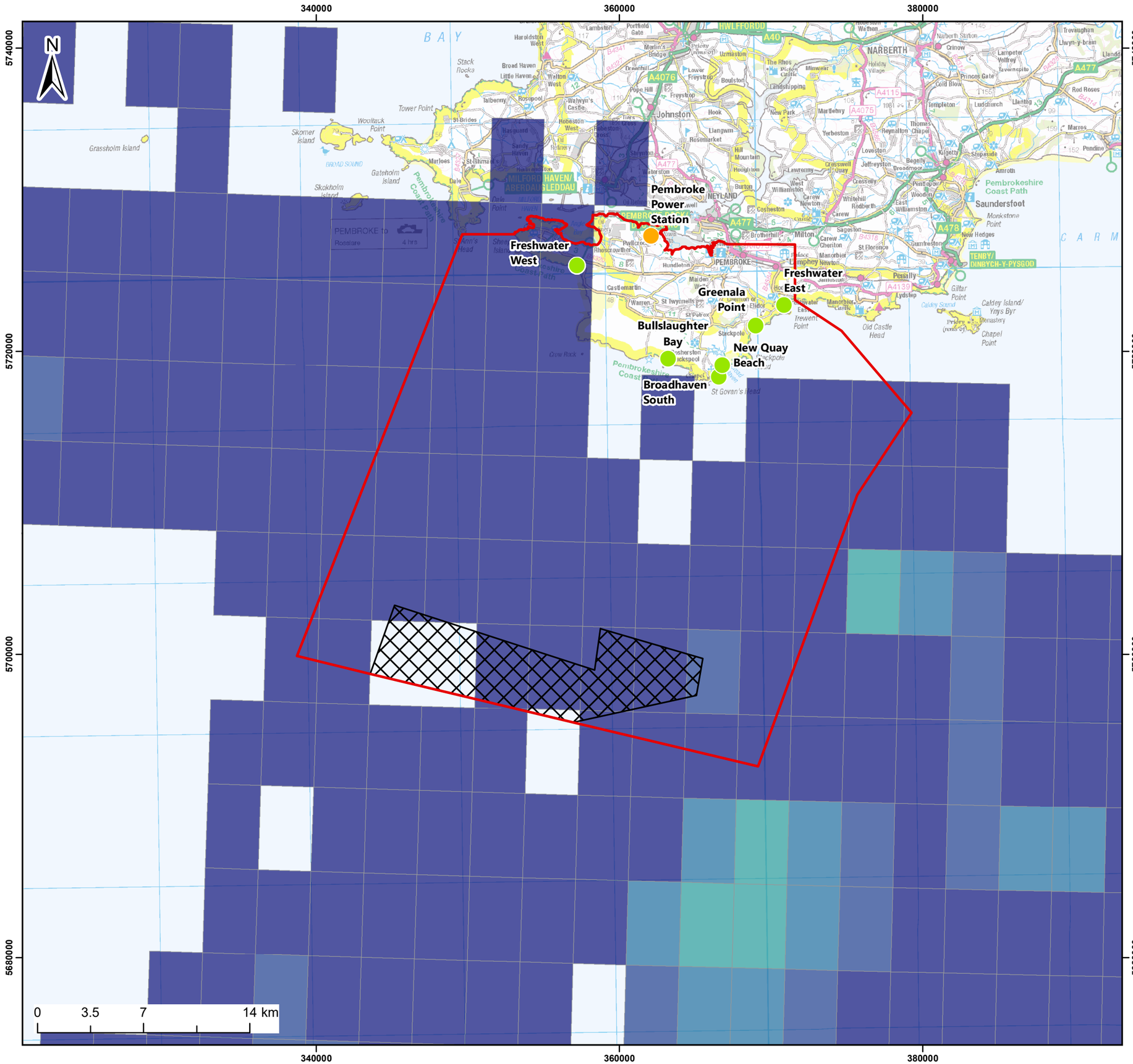

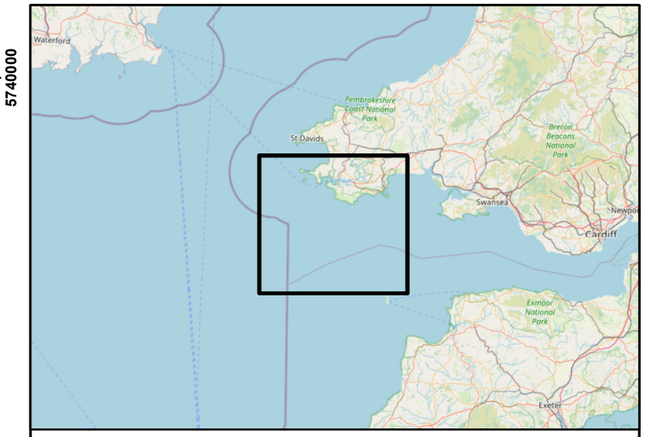

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Average UK >15m fishing Vessel Landings value 2011 - 2015 for static gear (£)

- >0 - 2500
- >2500 - 5000
- >5000 - 10000
- >10000 - 20000
- >20000 - 40000
- >40000 - 80000
- >80000 - 160000
- >160000 - 320000
- >320000- 640000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Average UK >15m Fishing Vessel Landings Value 2011 - 2015 for Static Gear (£)

Figure:	Drawing No:
A7.1.1	PC3562-RHD-ZZ-ZZ-DR-Z-0015

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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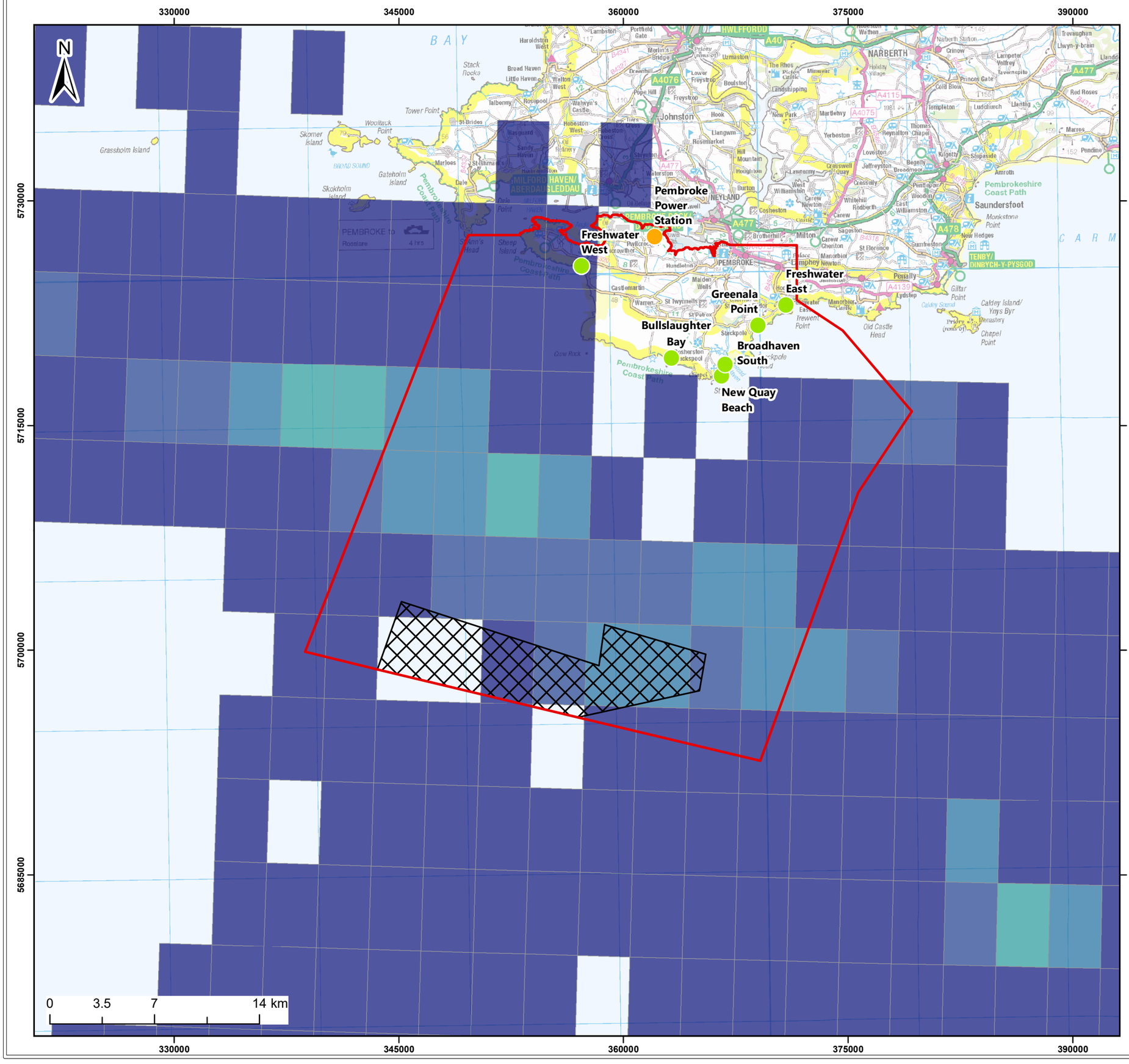

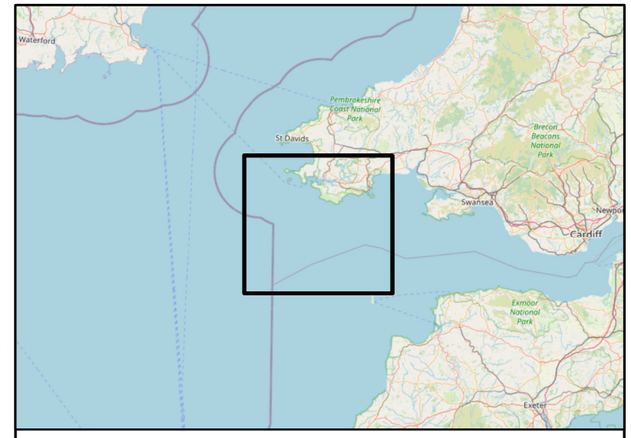

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Average UK >15m fishing Vessel Landings value 2011 - 2015 for mobile gear (£)

- >0 - 2500
- >2500 - 5000
- >5000 - 10000
- >10000 - 20000
- >20000 - 40000
- >40000 - 80000
- >80000 - 160000
- >160000 - 320000
- >320000- 640000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Average UK >15m Fishing Vessel Landings Value 2011 - 2015 for Mobile Gear (£)

Figure:	Drawing No:
A7.1.2	PC3562-RHD-ZZ-ZZ-DR-Z-0016

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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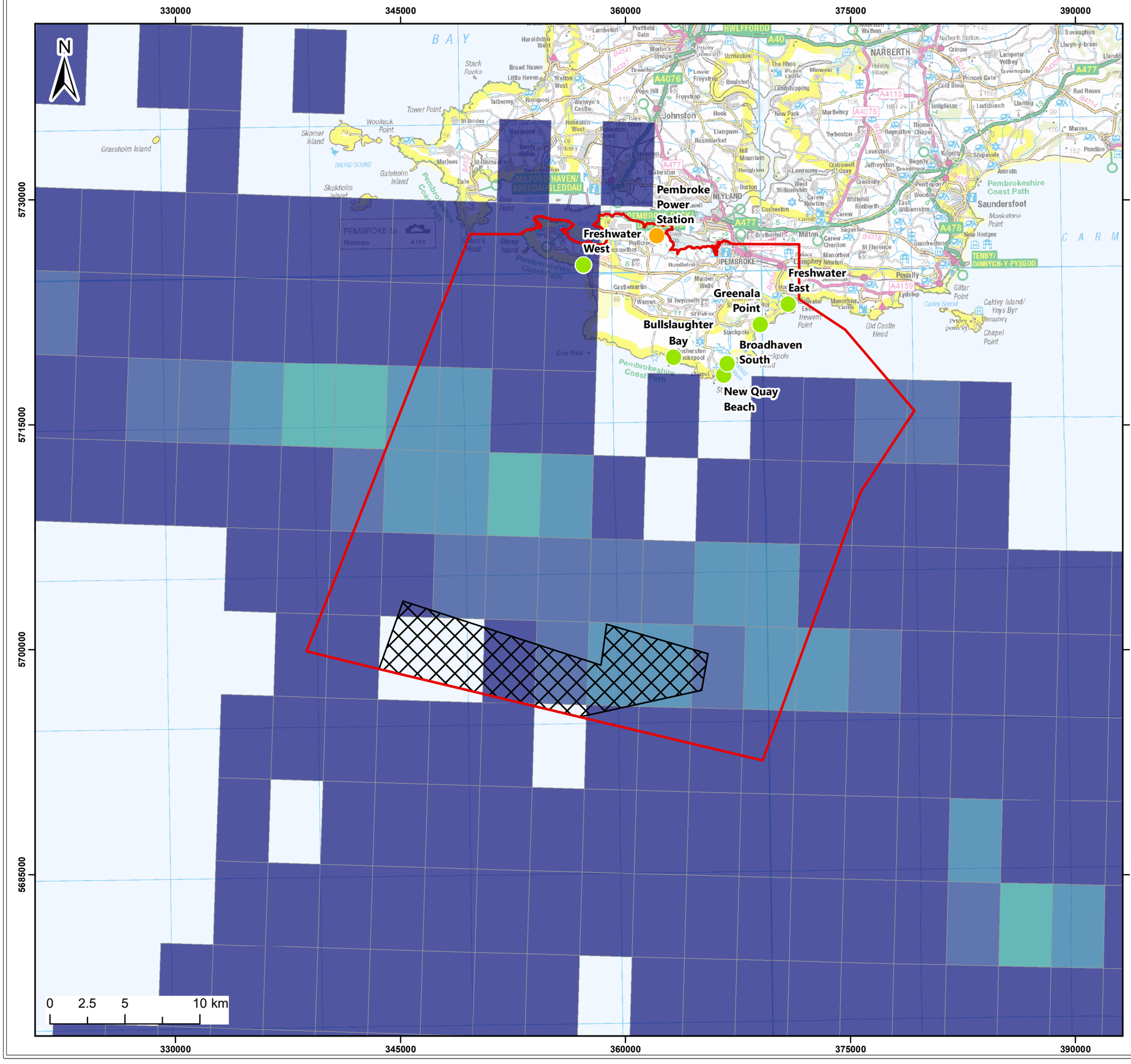

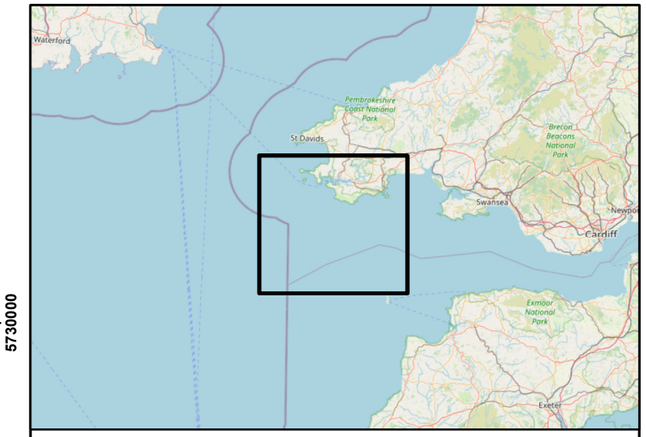

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Average UK >15m Fishing Vessel Effort 2011 - 2015 for Mobile Gear (KW/Hours)

- >0 - 2500
- >2500 - 5000
- >5000 - 10000
- >10000 - 20000
- >20000 - 40000
- >40000 - 80000
- >80000 - 160000
- >160000 - 320000
- >320000- 640000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Average UK >15m Fishing Vessel Effort 2011 - 2015 for Mobile Gear (KW/Hours)

Figure:	Drawing No:
A7.1.3	PC3562-RHD-ZZ-ZZ-DR-Z-0017

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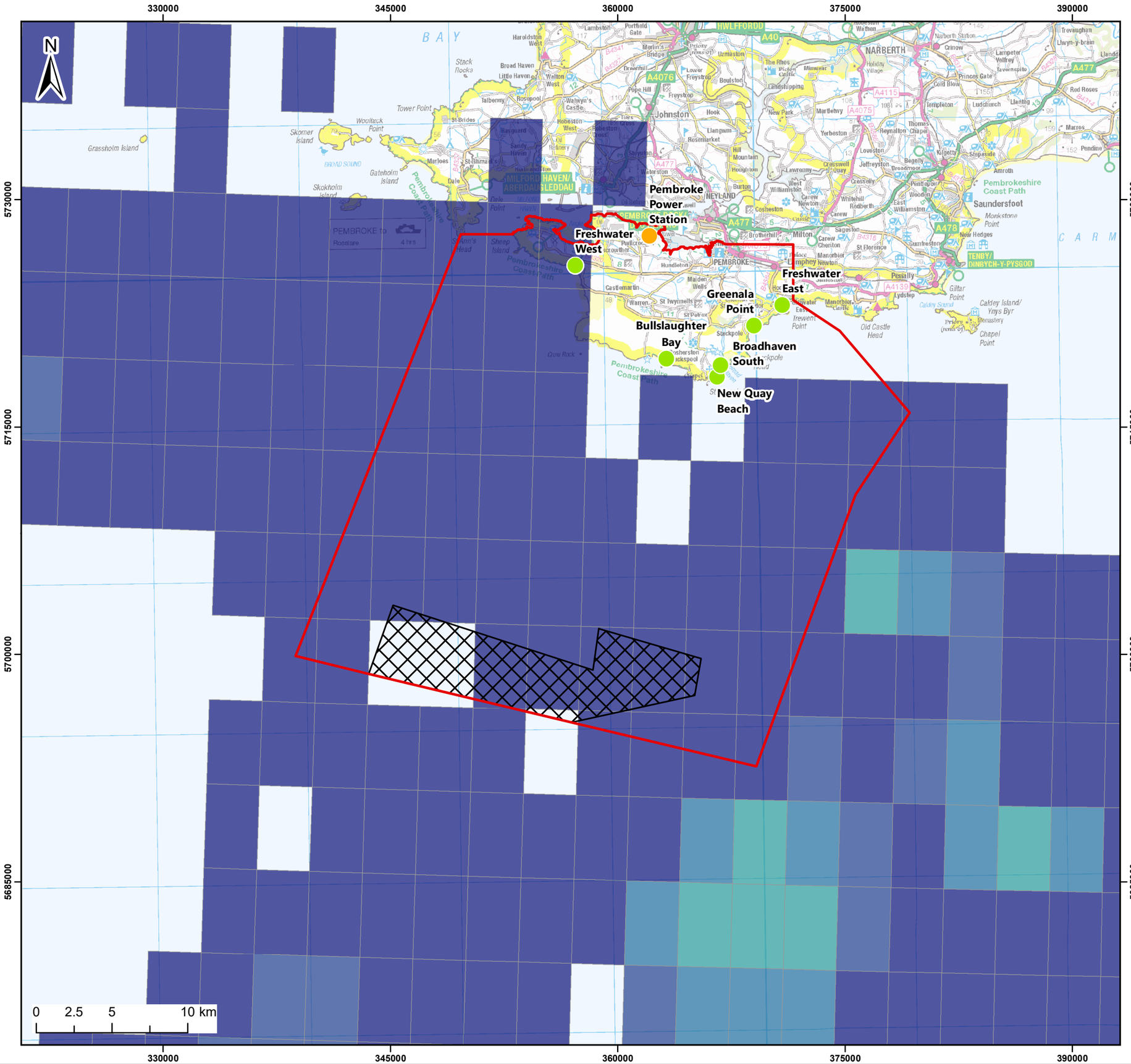

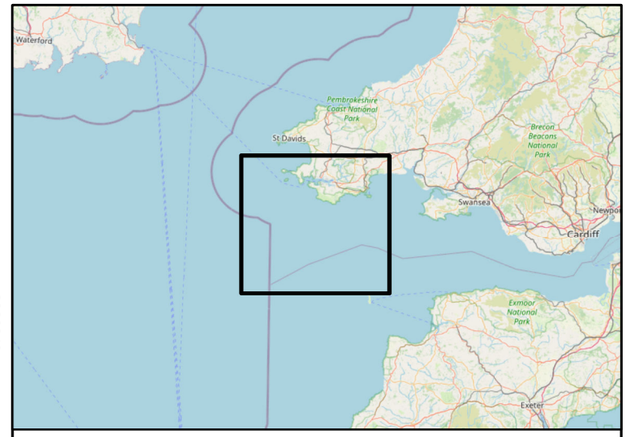

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Average UK >15m Fishing Vessel Effort 2011- 2015 for Static Gear (KW/Hours)

- >0 - 2500
- >2500 - 5000
- >5000 - 10000
- >10000 - 20000
- >20000 - 40000
- >40000 - 80000
- >80000 - 160000
- >160000 - 320000
- >320000- 640000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Average UK >15m Fishing Vessel Effort 2011- 2015 for Static Gear (KW/Hours)

Figure:	Drawing No:
A7.1.4	PC3562-RHD-ZZ-ZZ-DR-Z-0018

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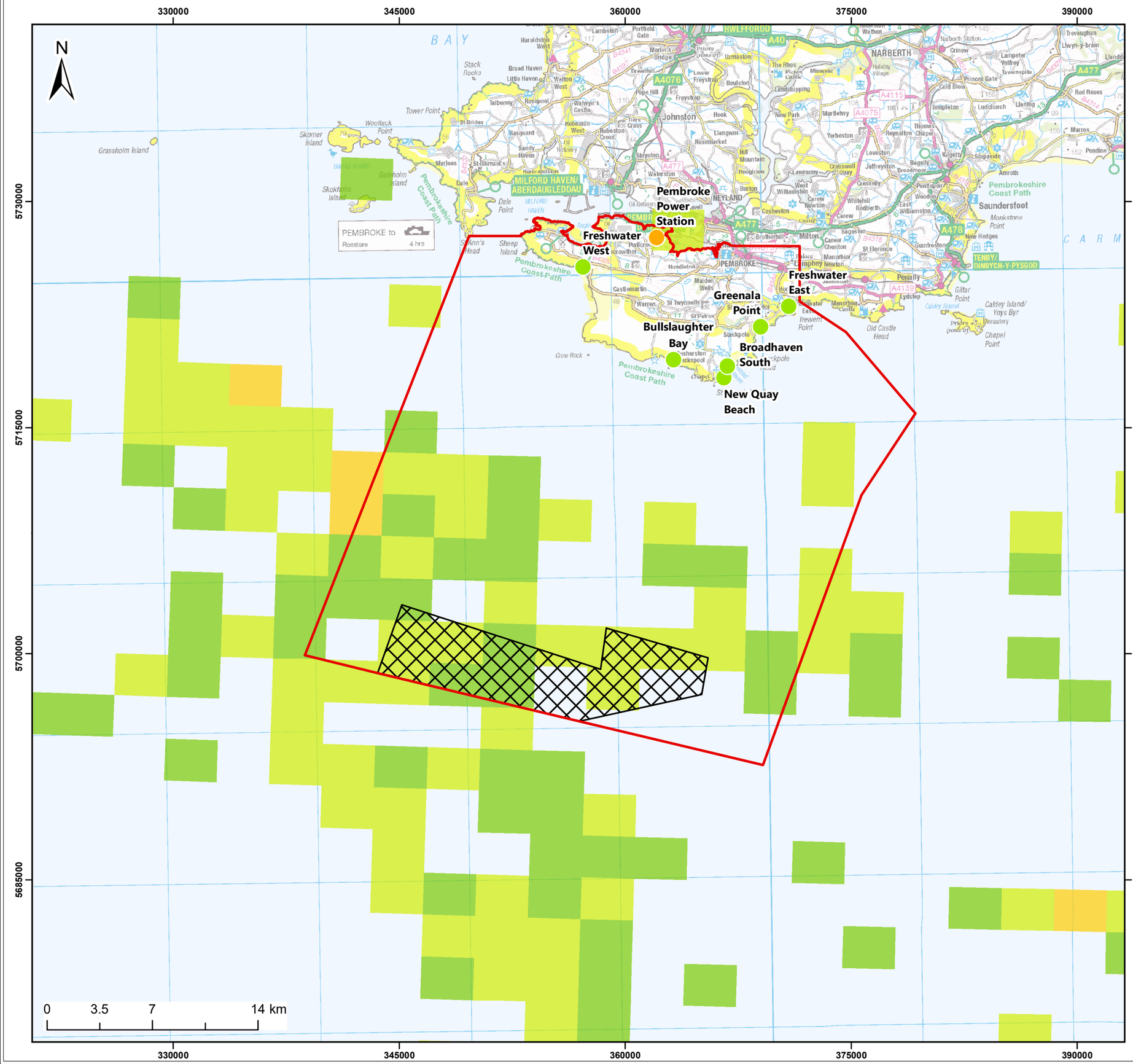

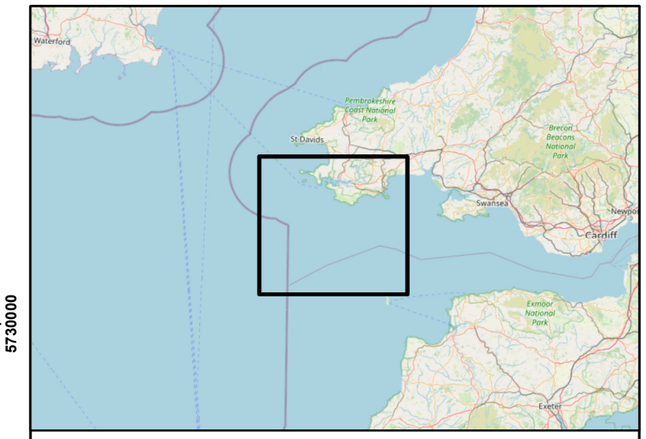

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Inshore Mobile Gear Fishing Activity Base On Vessel Sightings 2010 - 2012

- 0.000001 - 0.012345
- 0.012346 - 0.037037
- 0.037038 - 0.111111
- 0.111112 - 0.333333
- 0.333334 - 1.000000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Inshore Mobile Gear Fishing Activity Base On Vessel Sightings 2010 - 2012

Figure:	Drawing No:
A7.1.5	PC3562-RHD-ZZ-ZZ-DR-Z-0019

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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330000 345000 360000 375000 390000

5730000 5715000 5700000 5685000

N

Pembroke Power Station

Freshwater West

Freshwater East

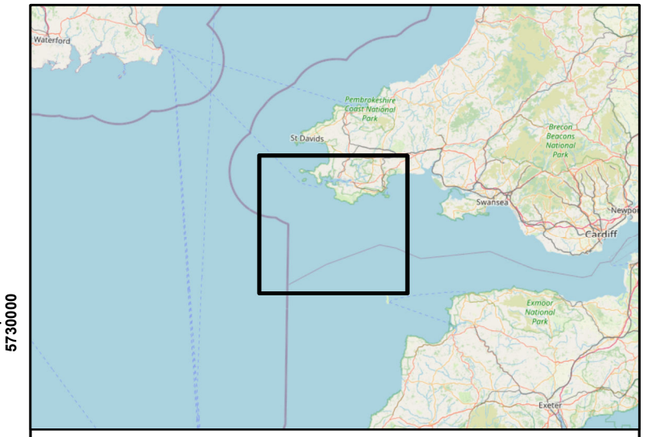
Greenala Point

Bullslaughter Bay

Broadhaven South

New Quay Beach

0 3.5 7 14 km



Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station

Inshore Static Gear Fishing Activity Base On Vessel Sightings 2010 - 2012

- 0.000001 - 0.012345
- 0.012346 - 0.037037
- 0.037038 - 0.111111
- 0.111112 - 0.333333
- 0.333334 - 1.000000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Inshore Static Gear Fishing Activity Base On Vessel Sightings 2010 - 2012

Figure: A7.1.6 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0020

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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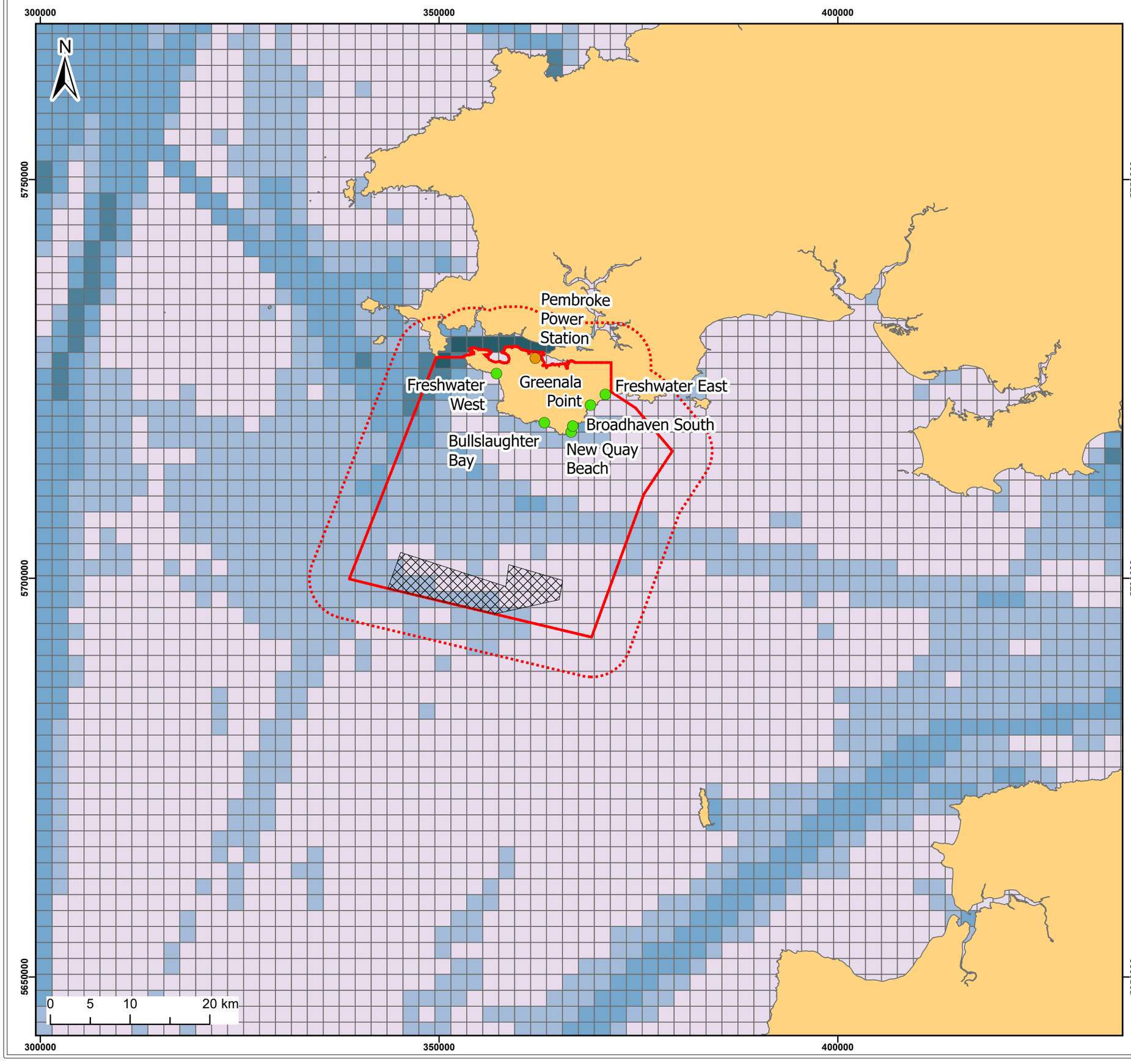

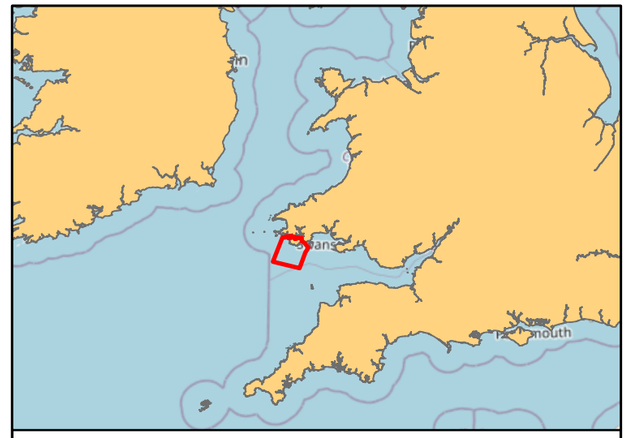

Legend:

- Project Area
- Project Area 5km Buffer
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Onshore Connection Point

Shipping Vessel Density Yearly Average

Average No. of Vessels

- 0 - 300
- 300 - 900
- 900 - 2000
- 2000 - 3500
- 3500 - 12000
- 12000 - 30000

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Shipping and Navigation

Figure:	Drawing No:
A7.2.1	PC3562-RHD-ZZ-ZZ-DR-Z-0026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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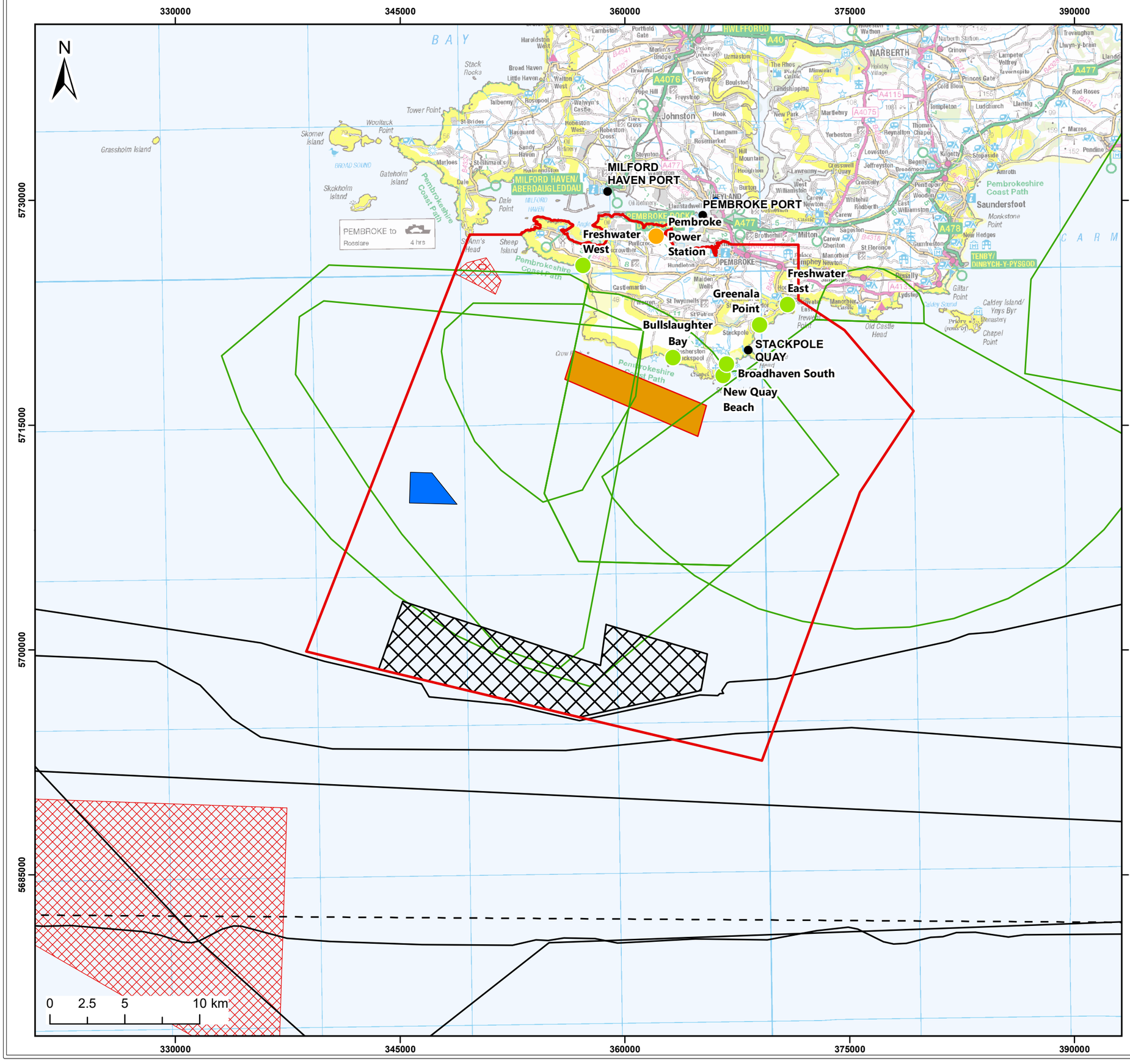

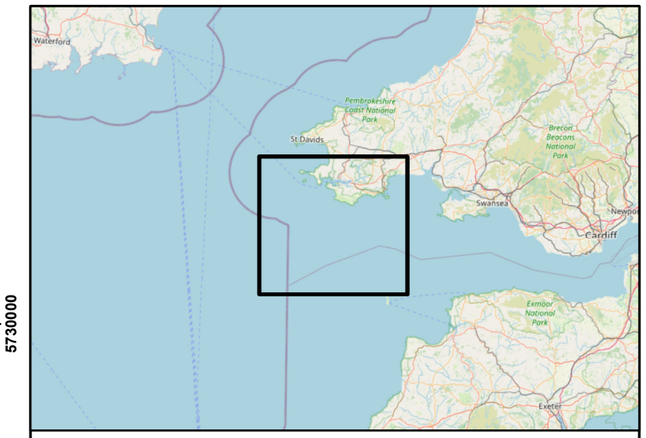

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Military Practice Areas
- Landfall Site Options
- Pembroke Power Station
- Ports
- Disused
- Closed

DISPOSAL SITES

- Open

Telecoms CABLES

2016 latest available data

- ACTIVE
- NOT ACTIVE

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Coastal and Marine Infrastructure Baseline Environment

Figure:	Drawing No:
A7.3.1	PC3562-RHD-ZZ-ZZ-DR-Z-0021

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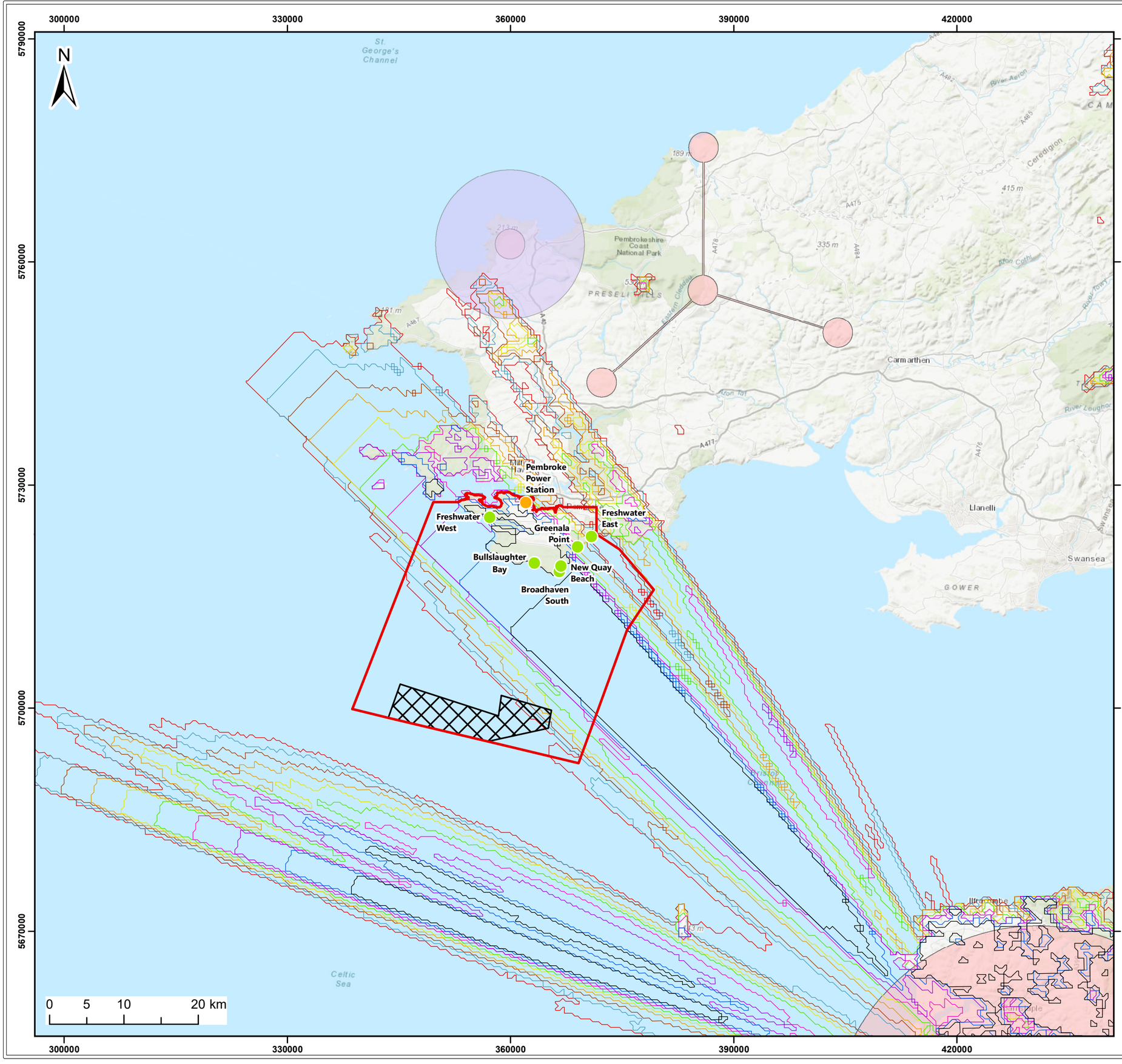

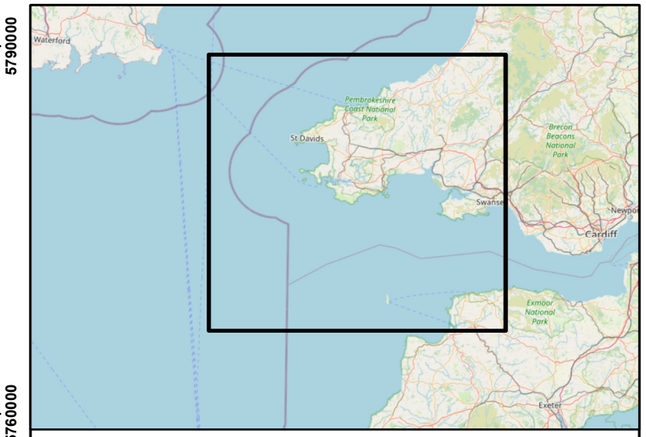

Legend:

- Project Area
- Pembrokeshore Demonstration Zone Area
- Landfall Site Options
- Pembroke Power Station
- AIR GROUND AIR COMMUNICATION SITES
- NAVIGATION AIDS
- SECONDARY SURVEILLANCE SITES
- PRIMARY RADAR 020
- PRIMARY RADAR 040
- PRIMARY RADAR 060
- PRIMARY RADAR 080
- PRIMARY RADAR 100
- PRIMARY RADAR 120
- PRIMARY RADAR 140
- PRIMARY RADAR 160
- PRIMARY RADAR 180
- PRIMARY RADAR 200

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Aviation and Radar Baseline Environment

Figure:	Drawing No:
A7.4.1	PC3562-RHD-ZZ-ZZ-DR-Z-0022

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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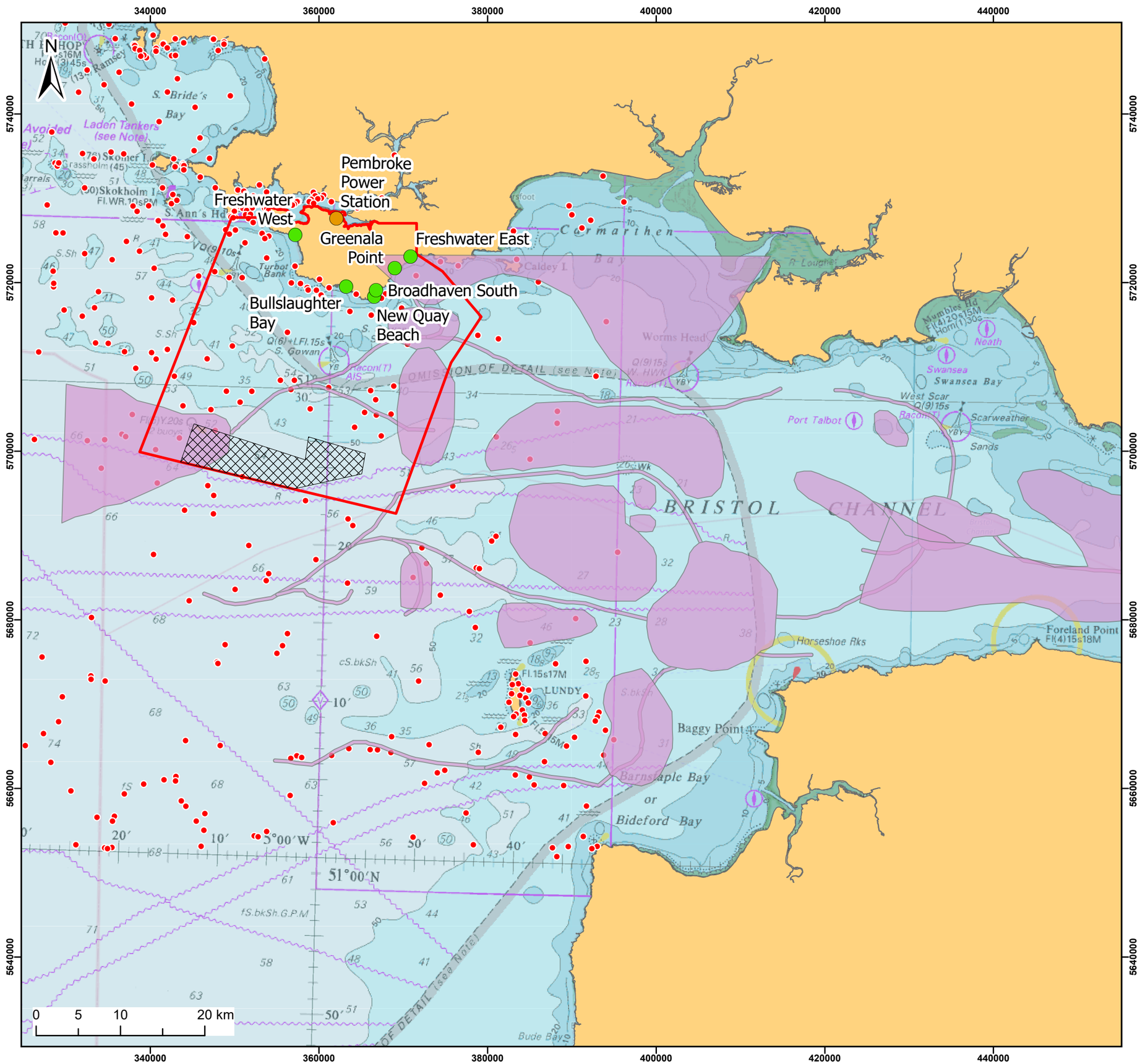

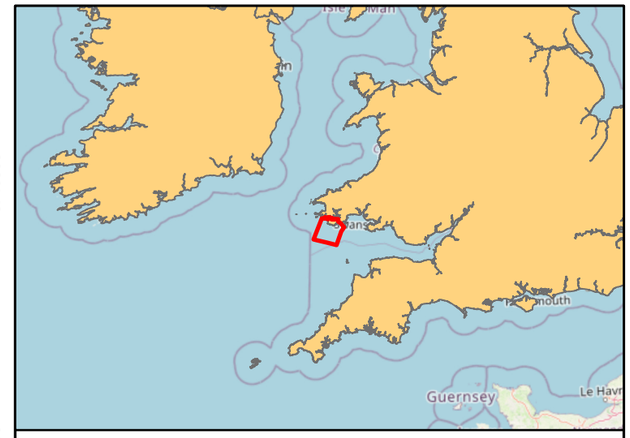

Legend:

- Study Area
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Onshore Connection Point
- Wrecks and Obstructions
- West Coast Palaeolandscape Survey Features

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Archaeology Offshore Ltd

Figure:	Drawing No:
A7.5.1	PC3562-RHD-ZZ-ZZ-DR-Z-0030

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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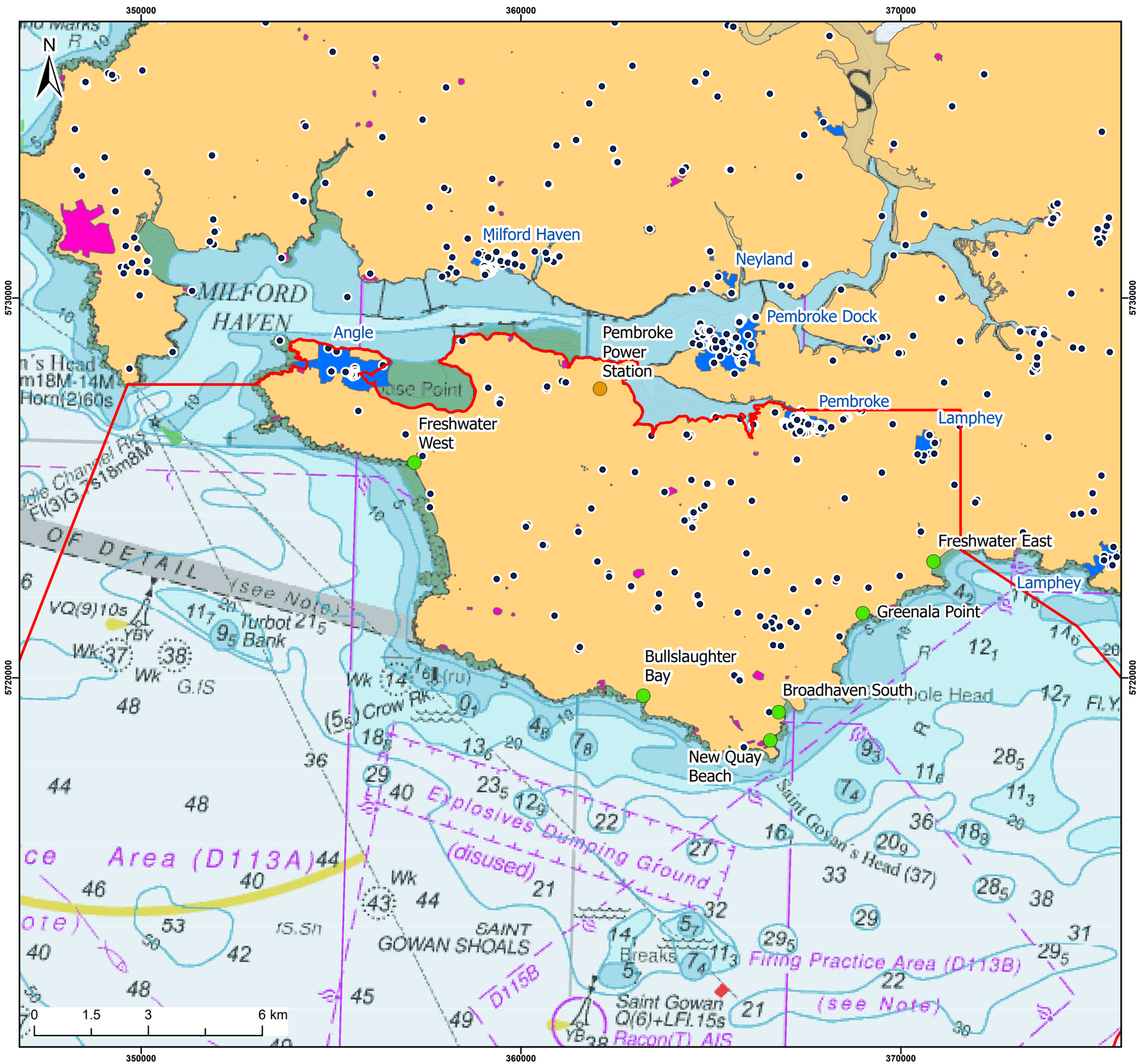

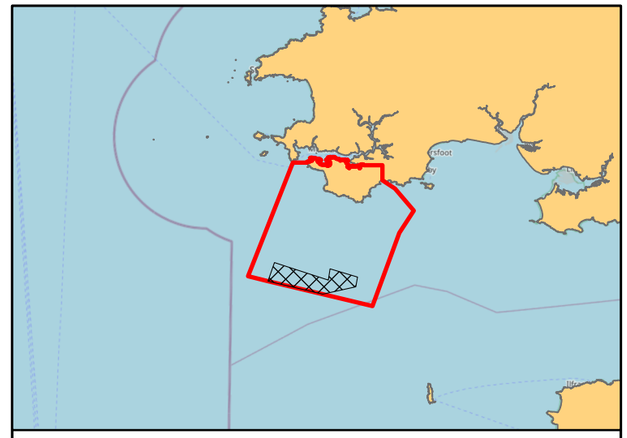

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Onshore Connection Point
- Listed Buildings
- Scheduled Monument
- Conservation Areas

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title: Archaeology Onshore

Figure: A7.5.2 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0028

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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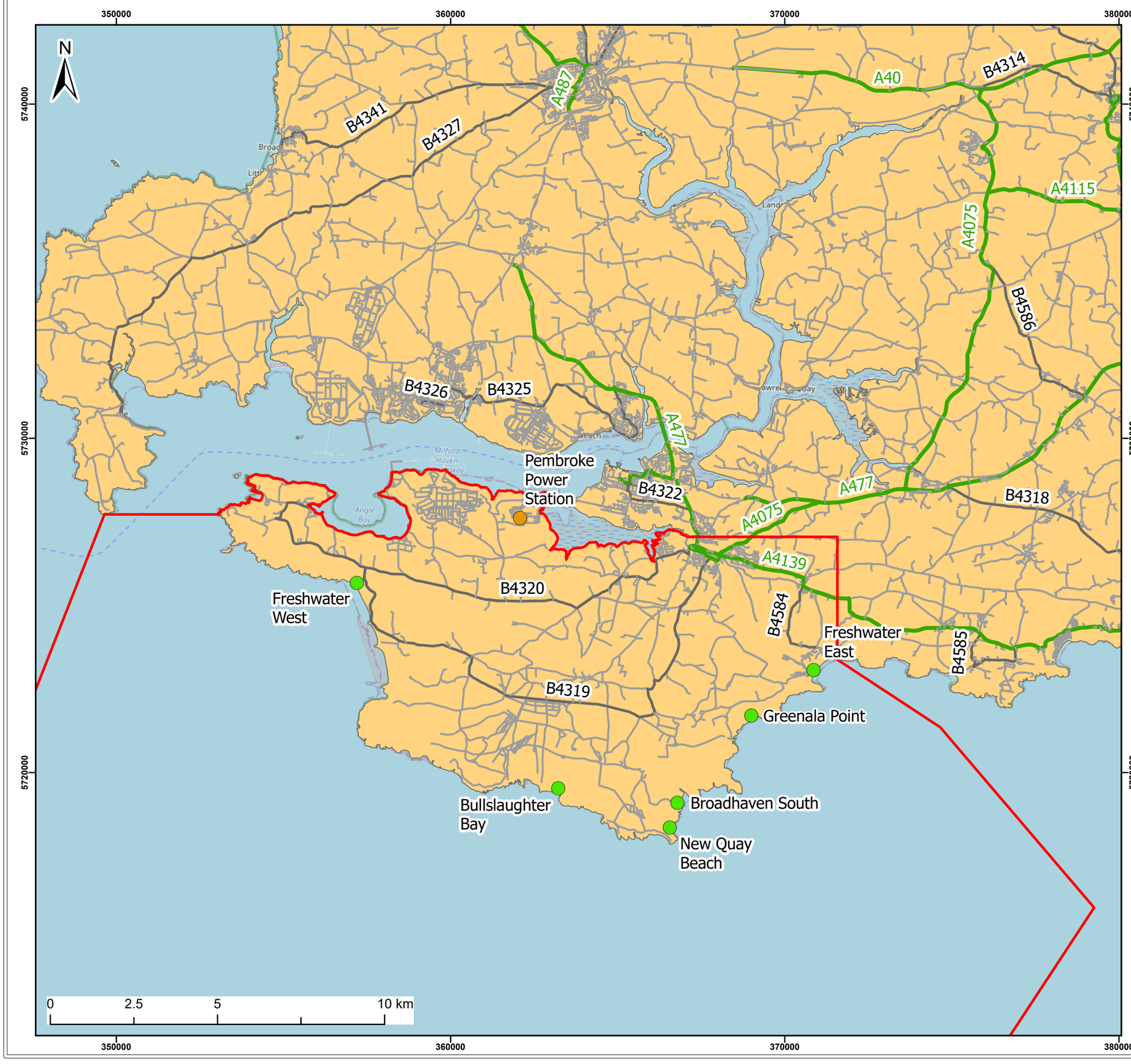

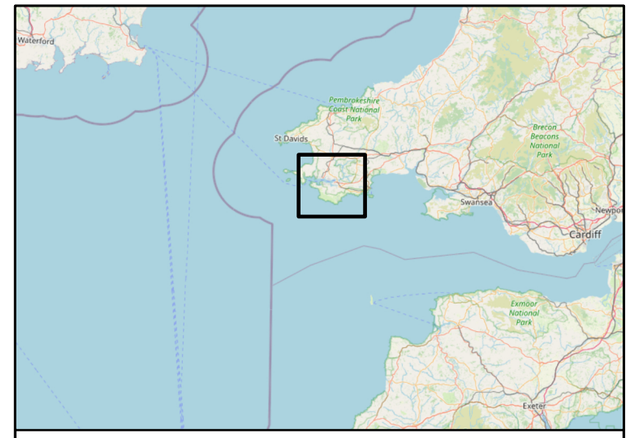

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area
- Proposed Landfall Options
- Onshore Connection Point
- A Road
- B Road
- Minor Road

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Highway Network with the Project Area

Figure:	Drawing No:
A7.7.1	PC3562-RHD-ZZ-ZZ-DR-Z-0023

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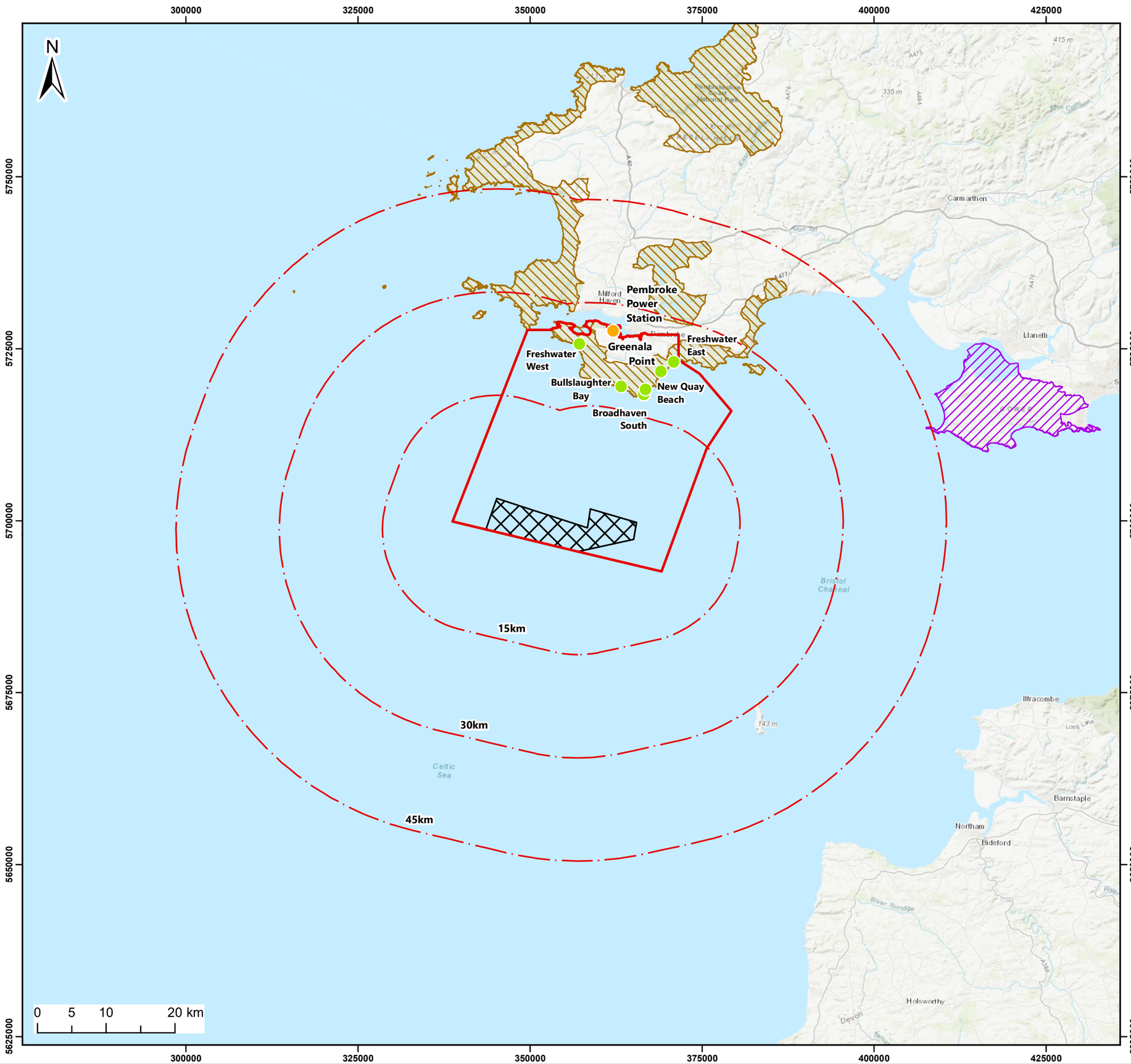

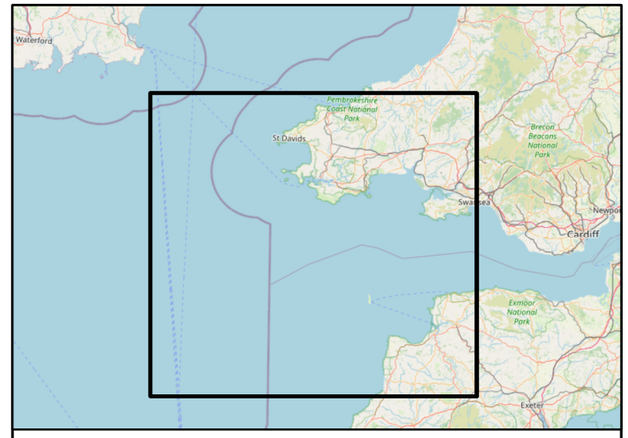

Legend:

- Project Area
- Pembrokeshire Demonstration Zone
- PDZ Buffer Zone
- Landfall Site Options
- Pembroke Power Station
- Gower - Area of Outstanding Natural Beauty
- Pembrokeshire Coast National Park

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Landscape, seascape & visual amenity - Overview plan

Figure: A7.8.1 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0024

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340000 360000 380000

5760000 5740000 5720000

N

Pembroke Power Station

Freshwater West

Freshwater East

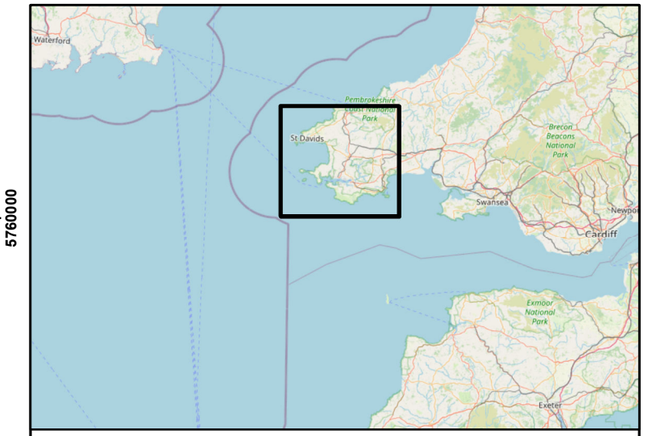
Greenala Point

Bullslaughter Bay

Broadhaven South

New Quay Beach

0 2.5 5 10 km



Legend

- Project Area
- PDZ Buffer Zone
- Landfall Site Options
- Pembroke Power Station
- Scheduled Monuments
- Conservation Area
- Coastal Path
- National Nature Reserve

Listed Buildings by grade

- I
- II
- II*

- Heritage Coast
- National Park
- Registered Landscapes Oustanding Special Interest

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Landscape, seascape & visual amenity - Pembrokeshire Coast

Figure: A7.8.2 | Drawing No: PC3562-RHD-ZZ-ZZ-DR-Z-0025

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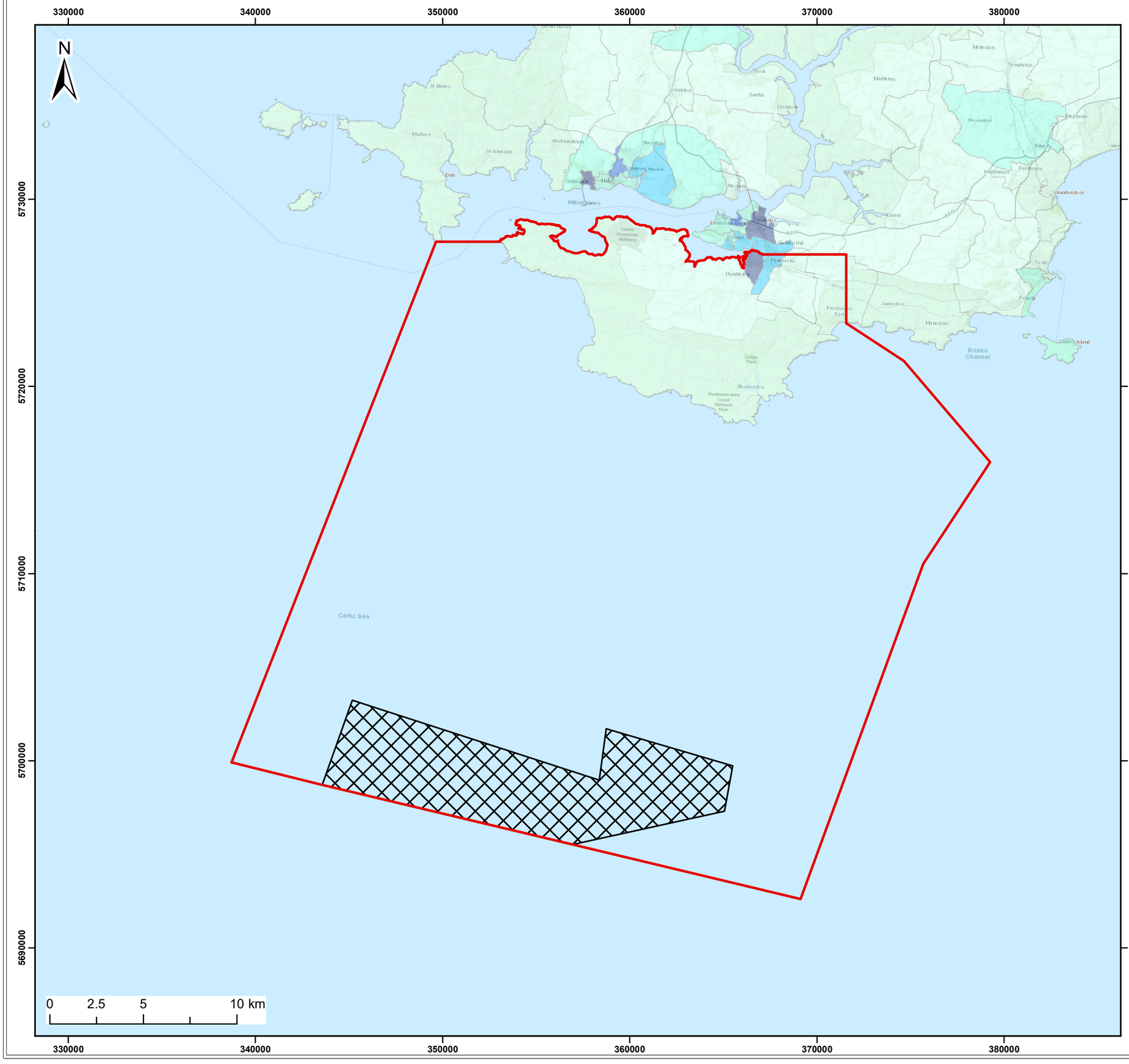

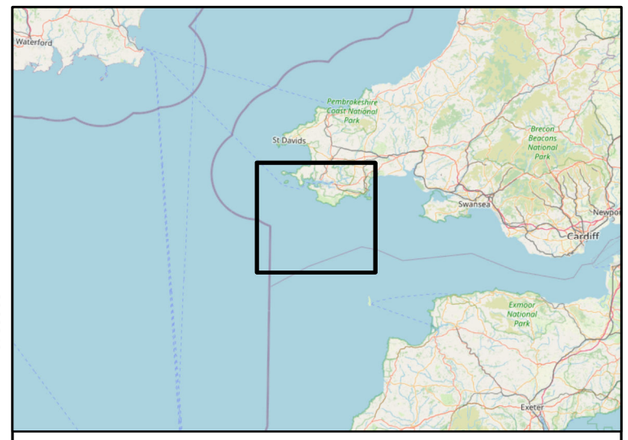

Legend:

- Project Area
- Pembrokeshire Demonstration Zone Area

Welsh Index of Multiple Deprivation

By Lower Level Super Output Area

10% Most Deprived	*RANK: 1 - 191*
10% - 20% Most Deprived	*RANK: 192 - 382*
20% - 30% Most Deprived	*RANK: 383 - 573*
30% -50% Most Deprived	*RANK: 574 - 955*
50% Least Deprived	*RANK: 956 - 1909*

Client:	Project:
Celtic Sea Power Ltd	Pembrokeshire Demonstration Zone

Title:

Welsh Index of Multiple Deprivation - Pembrokeshire

Figure:	Drawing No:
A7.13.1	PC3562-RHD-ZZ-ZZ-DR-Z-0027

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