

Morlais Tidal Demonstration Array Scoping Report

Morlais

22nd April 2015
Final Report v1
PB2735

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MORLAIS REQUEST FOR SCOPING OPINION

Menter Mon Cyf is seeking a Scoping Opinion for the proposed Morlais Demonstration Zone, in accordance with Regulation 7 of the Electricity Works (Environmental Impact Assessment (England and Wales) Regulations 2000 and in accordance with Regulation 13 of The Marine Works (Environmental Impact Assessment) Regulations 2007.

After receipt of scoping opinion, an Environmental Impact Assessment (EIA) will be undertaken, in support of applications for the following consents, licences and permissions:

- Consent under Section 36 of the Electricity Act, 1989;
- A Marine Licence under the Marine and Coastal Access Act, 2009; and
- Planning Permission under the Town and Country Planning Act, 1990.

Comment is also sought and welcomed from other stakeholders with an interest in the proposed development.

This scoping response has been produced by Royal HaskoningDHV and includes a description of the proposed development, description of baseline environment as currently understood and a description of the approach to the EIA.

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Abbreviations	
ADCP	Acoustic Doppler Current Profiler
AfL	Agreement for Lease
AIS	Automatic Identification System
AONB	Area of Outstanding Natural Beauty
CAR	Controlled Activities Regulations
CCW	Countryside Council For Wales
CO ₂	Carbon dioxide
DCO	Development Consents Order
°C	Degrees Celsius
DIO	Defence Infrastructure Organisation
DP	Dynamic Positioning
DECC	Department for Energy and Climate Change
EIA	Environmental Impact Assessment
EMF	Electro-magnetic field
EPS	European Protected Species
EU	European Union
HRA	Habitats Regulations Assessment
HDD	Horizontal Directional Drilling
IoACC	Isle of Anglesey County Council
km	Kilometre
kV	Kilovolts
LGDU	Local Government Data Unit
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MOD	Ministry of Defence
MPA	Marine Protected Areas
Morlais	Morlais Project
MPS	Marine Policy Statement
MSPD	Marine Spatial Planning Directive
m/s	Metres per second
m ²	Metres Square
µm	Micrometre
NO ₂	Nitrogen dioxide
NSIP	Nationally Significant Infrastructure Project
NSP	Noise Sensitive Properties
NRW	Natural Resources Wales
O&M	Operations and Maintenance
MW	Mega Watt
PPG	Pollution Prevention Guidelines
PTEC	Perpetuus Tidal Energy Centre
RAF	Royal Air Force
RES	Renewable Energy Strategy
RoRo	Roll-On Roll-Off (vessel)
RSPB	Royal Society for the Protection of Birds

Abbreviations	
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SCA	Seascape Character Assessment
SEACAMS	Joint approach from Bangor and Swansea Universities.
SLVIA	Seascape and Landscape Visual Impact Assessment
SPA	Special Protected Area
SSSI	Site of Special Scientific Impact
TCE	The Crown Estate
TCPA	Town and Country Planning Act
TEC	Tidal Energy Converter
TIA	Traffic Impact Assessment
UK	United Kingdom
V	Volts
WADZ	West of Anglesey Demonstration Zone
WNMMP	Welsh National Marine Plan

Spatial Definitions	
WADZ	West Anglesey Demonstration Zone- the area agreed as part of the current Agreement for Lease. This is the currently agreed boundary for the Morlais Demonstration Zone.
The project	This refers to the Morlais Demonstration Zone and is used to describe the project as a concept and as a built development.
Offshore scoping area	The offshore scoping area includes the WADZ, plus areas that are being considered as part of a potential change to the current WADZ boundary and with the addition of the cable route, with a buffer of 500m diameter. This is the area primarily used for scoping environmental interests although, for some receptors a wider search area was used, details of which are provided in individual sections. This area includes all areas where development may occur.
Substation location area	Potential locations have been identified for the onshore substation location; however, final locations have not been determined. This is a general area, centred around the Anglesey Aluminium works, that incorporates potential substation locations. This area is a focal point for onshore scoping within the wider Onshore scoping area. This area includes all areas where onshore development may occur.
Onshore scoping area	This is the general area that was considered during scoping and represents a 2km buffer centred on the Anglesey Aluminium works.
Onshore construction area	This refers to the footprint of the onshore construction works
Envelope	This refers to the Rochdale Design Envelope which seeks to provide a flexible set of technology parameters, in particular,

Spatial Definitions	
	outlining worst case scenarios, against which consent can be granted.
Device	This is a term used to refer to one unit of tidal technology installation, and includes foundation and tidal energy converter.

1 NON-TECHNICAL SUMMARY

1.1 The project

Menter Mon Cyf is proposing the Morlais Project to enable the development of the Morlais Demonstration Zone. The project aims to establish Anglesey as a progressive energy hub, whilst maximising opportunities for local communities through both directly through employment and indirectly through the establishment of a local supply chain where possible.

The Morlais Project will seek to provide a consented tidal technology demonstration zone with communal infrastructure such as export cables and substations, for tidal technology developers to install and test arrays of tidal energy converters.

1.2 The components

The consent application for the Morlais Demonstration Zone will include the following components;

- **Tidal energy devices.** As the aim of the Morlais Project will be to install multiple technology types, the consent application will be based on a design envelope (Rochdale Envelope), which will be determined through knowledge of existing technology and the direction of future developments.
- **Offshore electrical infrastructure.** Individual developers, depending on their devices, may need to construct offshore energy hubs as part of their array. In addition, there will be a need for offshore electrical hubs for the conversion of energy into an exportable format.
- **Offshore inter-array cables.** Inter-array cables will be used to connect individual devices within the array as well as connecting arrays to an offshore electrical hub. Developers will be responsible for connections to the offshore hub as cabling requirements may differ between technologies.
- **Landfall and onshore cable route.** The land fall is expected to be at Penrhos Beach to the east of Holyhead. The offshore cable will be brought a short distance onshore and will then be connected to an onshore cable within a transition pit. The onshore cable route will then join the offshore infrastructure with the onshore substation. Other nearby developments such Morlais has been in ongoing discussions with Minesto in regards to sharing export cable route, land fall and onshore infrastructure between Morlais and Minesto's Deep Green project. It is anticipated, provided both projects gain consents, this would be the most likely approach in order to minimise environmental impacts and the number of individual grid connections required. Minesto has submitted a request for Scoping Opinion to the Isle of Anglesey County Council for the onshore cable route and substation locations¹.
- **Onshore substation.** The location and design of the onshore substation has not been determined at this stage, although it is predicted that the substation will be located in the vicinity of the Anglesey Aluminium Metal works.

¹ Exodus (2015) Minesto Deep Green Holyhead Deep Project-request for scoping opinion. Ref L-100194-S00-LETT-001. 15th of January, 2015.

- **Grid Connection.** As the substation location and grid connection have not been finalised, the link between the substation and grid connection has not been included within this scoping report. The Minesto Deep Green project's request for Scoping Opinion¹ indicates that, depending on the substation option, either SPEN or National Grid Plc will become the grid supplier and that the grid connection point will be determined through detailed design following these decisions. This will be included within the EIA when a greater level of information is known.

2 INTRODUCTION

This document is the environmental scoping report for the Morlais Project (the Project) which seeks to establish Anglesey as a marine energy hub whilst adding value to the local community and economy. The Project will be in the West Anglesey Demonstration Zone (WADZ) agreement for lease (AfL) area.

The aim of this scoping report is to communicate initial project information, identify data gaps and determine the potential environmental constraints and benefits associated with the construction, installation and operation of the project. This report represents the first key stage in the Environmental Impact Assessment (EIA) process and will ensure that stakeholders are aware and informed of the scheme.

Scoping responses are sought from:

- Natural Resources Wales (NRW), in consultation with the Marine Management Organisation (MMO); and
- Anglesey County Council.

2.1 The developer

Morlais was established by Menter Môn as a development team for the Morlais Demonstration Zone and is comprised of a number of Menter Môn employees as well as specialists who have been employed specifically to develop the WADZ.

Menter Môn is a third sector social enterprise, delivering projects across North Wales in various industries. Menter Môn's motivation for this project is to establish Anglesey as a marine energy hub and secure maximum added value for the local economy. Morlais Energy has identified the following project objectives, which are ranked in order of their assessed importance:

1. Long term financial income / resources for reinvestment;
2. Development of locally based skills;
3. Attracting investment to the area;
4. Becoming a centre of excellence for such technologies;
5. Providing a world class facility for tidal energy development;
6. Preserving the environment; and
7. Securing a sustainable energy supply for the area.

2.2 Site description

2.2.1 Offshore site

An Agreement for Lease (AfL) for the development of the West of Anglesey Demonstration Zone was obtained by Menter Môn from The Crown Estate (TCE) in July 2014 (**Figure 2.1**).

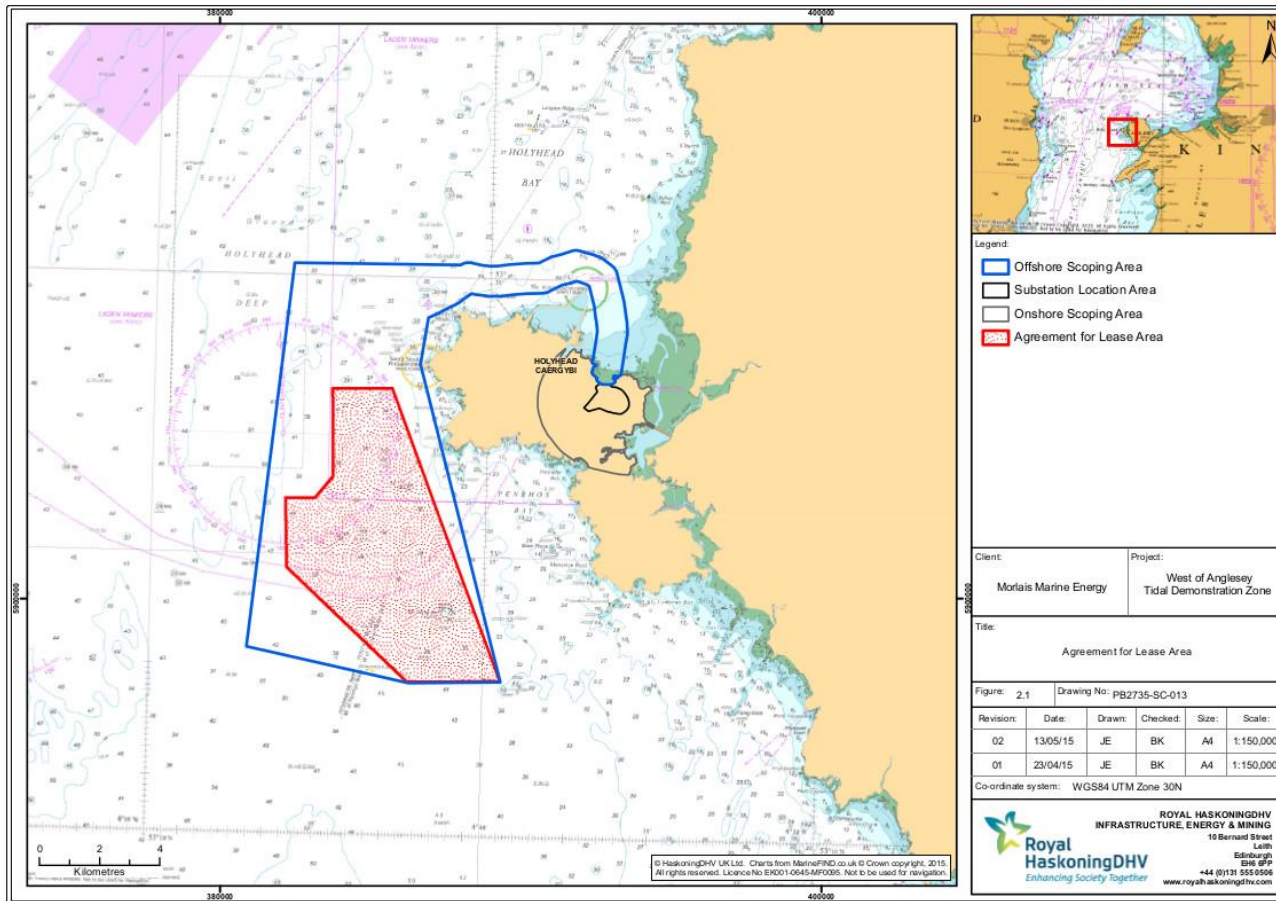


Figure 2.1 The Existing WADZ boundary and overview of scoping areas

The WADZ is one of several areas around the United Kingdom for which an AfL has been awarded by The Crown Estate, with the purpose of encouraging and accelerating marine renewable technology development. Each of these areas was identified because it offers a viable wave and/or tidal energy resource and access to necessary infrastructure, including ports and electricity grid.

The WADZ covers an area of 37km² and is located approximately 1km at its nearest point from the west coast of Holy Island, Anglesey. The WADZ is located within an area with a range of tidal resources, with stronger tidal regimes towards the north of the area.

The WADZ was primarily selected for its tidal resource based on best available information at that time. In the light of more recent information Menter Môn is currently in discussions with TCE regarding amendment to the WADZ boundary in order to maximise the available resource. This Scoping report has focused on an offshore scoping area which encompasses the existing WADZ boundary and the area that may look to be included as part of potential proposed boundary changes (**Figure 2.1**). If boundary changes are agreed, the final lease boundary would remain at 37km², with the potential to deliver up to 100MW of tidal energy.

This scoping report also includes, within the offshore scoping area, an area 500m either side of the currently proposed export cable route. The potential for the export cable route from the Minesto Deep Green tidal development project to join this cable route and have a joint landfall and onshore infrastructure is being explored.

2.2.2 Onshore site

The landfall for the export cable from the WADZ is expected to be at Penrhos Beach, which is an expanse of sandy beach between Penrhos and Holyhead. This will follow the same route as described in the Minesto's request for Scoping Opinion.¹ Having a shared landfall and onshore infrastructure is currently the preferred approach and discussions between Morlais and Minesto are at an advanced stage. Other land fall options are likely to be constrained due to coastal geology, the presence of the Beddmanarch and Cymran Site of Scientific Interest (SSSI) to the east of Penrhos Beach and Holyhead Harbour to the west.

The area between the landfall and the potential onshore substation location is largely open land, with some area of development and rough open ground. There are some areas of ecological importance near the proposed landfall, which will be discussed further in **Section 7.6**.

This scoping report includes the onshore cable route and substation. The current location of the substation has not been determined, however, an area within which the substation is expected to be located has been identified and has been submitted as part of the Minesto Scoping Opinion Request and identified two likely areas for the substation to be located. Figure 2.1 shows a substation location area based on the locations identified in the Minesto Screening Opinion Request, although the area has been extended to include some adjacent land for the purposes of scoping... A buffer of 2km around the centre of this area and the onshore cable route (onshore scoping area), has been used for the scoping study (**Figure 2.2**Error! Reference source not found.).

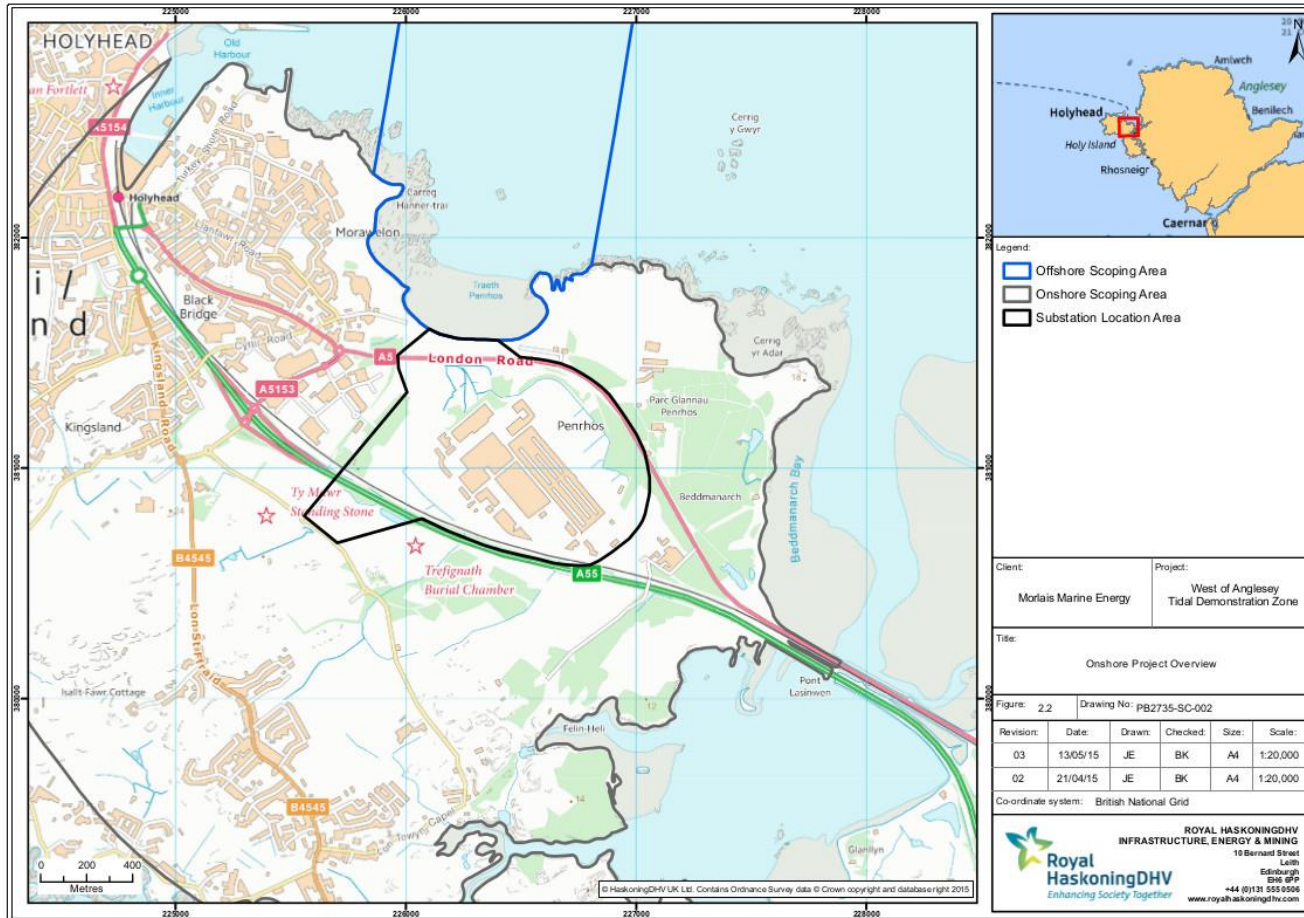


Figure 2.2 Onshore scoping and substation location area

2.3 Project overview

Recent information on the tidal resources within the WADZ shows that tidal stream resource across the WADZ varies considerably. Initial studies completed under the management of SEACAMS (a collaboration between Swansea, Aberystwyth and Bangor Universities), as well as Acoustic Doppler Current Profile (ADCP) data gathered from the area, indicate that the greatest tidal stream resource is located in the north of the WADZ. These studies also show that further tidal stream resource also exists to the north of the WADZ. This new information is a key driver for current discussions with TCE regarding potential changes to the boundary of the WADZ. Other applications for revisions to an AfL have been successful in the past, for example, at the Brims Tidal Array (formally Cantick Head), in the Pentland Firth, where the size, shape and extent of the original development site was revised.

The offshore area that is considered within this Scoping Report has been extended beyond those of the currently agreed boundaries of the AfL, so that, if a move is sought, the new boundary of the Zone will have been included within the Scoping Report. It is worth noting that, if moved, the size of The Zone will remain at 37km².

2.4 Components

The Development will consist of the following;

- Offshore Tidal Generators;
- Inter-array cables;
- Potential offshore hub (s) or substation;
- Export cable to landfall;
- Onshore cabling from landfall to substation; and
- Onshore substation.

These elements are used as the basis for consideration of potential environmental impacts in this Scoping report.

2.5 Development processes

2.5.1 Defining the project

Morlais will seek a Section 36 consent and Marine Licence for multiple devices and communal infrastructure based on a Rochdale Envelope approach. This would include consent for the installation and operation of Tidal Energy Converter (TEC) arrays as well as the export of generated power to the onshore infrastructure and eventually the Grid. The aim would be to provide an envelope based consent and facilities for TEC developers to install TEC demonstration arrays.

Morlais will install communal infrastructure such as offshore substation, export cable route and onshore infrastructure from landfall to project substation. Prospective tenants would be expected to install their own TEC arrays and install any infrastructure required to transmit generated power to a communal focal point (such as an offshore hub).

Where a technology falls outside the consented envelope, a separate Marine License may need to be applied for if deployment at Morlais is desired

Each deployment is likely to require an application for a license to disturb European Protected Species (EPS) for both deployment and operation. This will be determined by the impact assessments for each EPS and will be discussed and agreed during consultation with NRW and the MMO.

The final location of tidal devices within the zone will be decided through an assessment of the devices needs, the availability of suitable locations within the WADZ and potential environmental, physical and human use constraints..

Planning specific array locations within the WADZ would be influenced by several environmental factors; with individual developer's devices having specific considerations. Most devices require specific tidal resource and bathymetry and these factors are discussed further below.

Resource- Within the WADZ there are a range of tidal conditions. Sufficiently strong tidal streams are required to ensure that a project is economically viable. In addition, the direction of flow, turbulence and ebb and flow ration need to be within the tolerance factors for the technology to be installed. Different technologies are anticipated to have different tolerances and requirements.

In consultation with Morlais, developers would be responsible for identifying a location that suits their technology. Tidal stream conditions and resource availability heavily influence project design, cost and payback and are therefore a primary driving factor in influencing project locations.

Morlais is currently organising an Acoustic Doppler Current Profiling (ADCP) survey of the site as well as using existing data from SEACAMS, to provide more detail on tidal resource across WADZ.

Bathymetry- Water depths within the Scoping Area vary between 32m and 56m Water depth is an important consideration for location as this will have an influence on the most appropriate foundation, installation methodologies, cost of materials. Water depth will also have a large bearing on methods for devices maintenance and any project design elements required for facilitating maintenance procedures.

In addition to developmental considerations, the suitability of specific locations is likely to be influenced by stakeholder concerns and wider issues identified through the EIA process.

2.5.2 Grid connection development

A grid connection agreement has been made for an initial 13.5 MW, and it has been identified that there is scope for pursuing an application for additional capacity which will allow for Morlais' aspiration of up to 100MW installed capacity.

A high level 'optioneering' study has highlighted a number of possible routes that the export cables could take. The preferred option is a route to the north of Holy island, making landfall near to Anglesey Aluminium.

As previously discussed, Morlais is in an advance stage of discussion with Minesto regarding the possibility of sharing a single offshore export cable between the WADZ

and Minesto's Deep Green Project. These discussions will determine the details of a shared cable and onshore infrastructure, and the ultimate responsibility for its consenting and installation.

2.6 Pre-scoping consultation

Pre-scoping briefing meetings have been held with the regulators for onshore and offshore components of the project. Briefings were provided to Anglesey County Council, Natural Resources Wales and the Marine Management Organisation on 12th January 2015.

2.7 Layout of this document

This document is laid out as follows;

Section 3: Project boundaries, approach to EIA and Consenting Process

Section 4: Project description

Section 5: Key policy and legislation objectives

Section 6: Physical environment

Section 7: Designated sites and biological environment

Section 8: Human environment

Section 9: Cumulative impact and proposed CIA methodology

Section 11 Summary of baseline condition

Section 11 Proposed EIA Methodology

3 PROJECT BOUNDARIES, APPROACH TO EIA AND CONSENTING PROCESS

This chapter defines the geographical and technical boundaries of the EIA along with the approach that Morlais plans to take with regards to site development and the implications of the EIA process.

3.1 Geographical boundaries of project components

The Project will consist of several technological components. All offshore development will be undertaken within the offshore scoping area, as shown in **Figure 2.1**. All onshore development would occur within the onshore scoping location shown in **Figure 2.2**. In addition, **Figure 2.2** shows a substation location area which is based on initial identification of potential substation locations. It is anticipated that the final substation location and onshore cable route would fall within this area.

The project may include the following components (if required);

- Offshore tidal energy converter arrays, inter-array cables and offshore hubs;;
- Export cable to shore and landfall area at Penrhos Beach; and
- Onshore cable and substation location.

3.2 Approach to EIA- Rochdale Envelope design

The 'Rochdale Design Envelope' approach is a process developed through planning case law and adopted for use in offshore renewable consenting, where there are often significant technological uncertainties during consent application. Flexibility is required within the consenting process to ensure that projects are assessed realistically, but without unduly restricting engineering, before a full appraisal of appropriate technology can be undertaken.

The Rochdale Design Envelope (Envelope) approach seeks to provide consent for a set of parameters into which the final project will fall. It seeks to identify the maximum environmental impact based on the realistic worst-case scenario derived from the Envelope.

The tidal sector is an emerging industry with a wide range of technology types, installation methods and operational procedures. The Envelope approach is particularly important for projects such as the Morlais Demo Zone project as it is likely that multiple types of devices will be installed at any one time. For this reason, Morlais intend to use the Envelope approach when undertaking the EIA for the Development.

An Envelope has been developed through discussions with potential tenants, a review of existing technologies and a review of the approach taken at other projects, for example, the recent Perpetuus Tidal Energy Centre (PTEC) project.

Our approach is based on the definition of a number of technological components, such as devices, foundations, cabling and required electrical infrastructure. For each of these components, a maximum set of parameters will be identified and used during the EIA, these parameters for example;

- Support structure footprint;

- Offshore substation height;
- Number of array cables;
- Height of seabed mounted infrastructure; and
- Footprint of onshore substation.

The Envelope will identify the realistic worst case parameters for use in impact assessment.

3.2.1 Summary of components to be included in EIA

The components of the project which will be assessed in the EIA include:

- Offshore:
 - Tidal devices (Devices), incorporating:
 - Foundation structures and associated support and access structures;
 - Tidal Energy Convertors (TECs); and
 - Seabed preparation measures for foundation construction (where necessary).
 - Offshore substation/ hubs;
 - Site monitoring equipment;
 - Inter-array cables within each berth to connect tidal devices to one another and/or an electrical hub;
 - Surface floating navigation buoys;
 - A subsea cable network, including:
 - Export cable(s) to shore; and
 - Cable protection measures (where necessary).
- Onshore:
 - Landfall works, including possible transition pits;
 - Cable installation from landfall to the project substation room;
 - The substation and associated infrastructure;

4 PROJECT DESCRIPTION

4.1 Project background

The project is currently at a very early stage of development and much of the detail for the project is as yet unknown. The following section outlines the technology components that will be considered in the EIA.

4.2 Technology envelope

Morlais has undertaken a thorough review of the tidal industry and the current state of TEC technology to determine an inclusive design envelope based on;

- Initial discussions with prospective tenants to learn what technology they will be looking to test and their requirements for undertaking testing;
- A review of current tidal technology to determine what is currently being tested and what technology is currently under development and will require testing within the next 10 years; and
- A review of design envelopes used for scoping and EIA for similar projects such as PTEC.

As a result of these discussions the Envelope will be based around the following general principles;

- Deployed capacity may be up to, but will not exceed 100W;
- Horizontal and vertical axis turbines will be included;
- We will include surface floating technologies such as the Scotrenewables / Bluewater types, and the Tidal Stream types;
- We will include mid water column types of technologies such as Plat-O, but not Minesto;
- Large scale surface piecing, pile based technologies, for example, SeaGen or Kepler types of technology, will not be included;
- We will include seabed mounted technologies, to include Delta Stream, OpenHydro, Hammerfest, HyTide etc.
- Pile, gravity base and anchored foundation types will be included; and
- Surface piercing, monopile mounted substation / hubs will be included.

4.3 Overview of technology

4.3.1 Tidal energy convertors

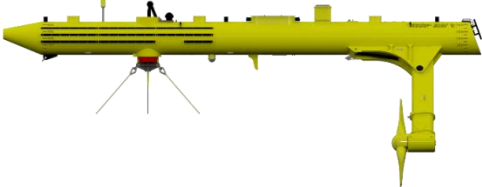

The following section provides an overview of progressing tidal technology and installation methods that will be included within the Rochdale Envelope.


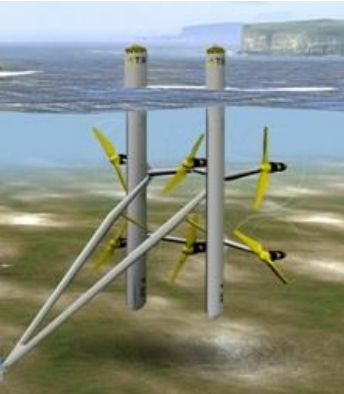

A number of representative tidal technologies will be considered in order to capture the likely range of Tidal Energy Converters (TEC) that may be deployed within the Zone. **Table 4.1** provides examples of devices that are currently in development and could be candidates for deployment at the West of Anglesey Demonstration Zone.


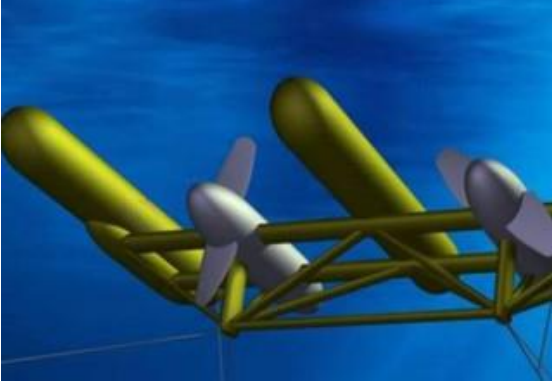
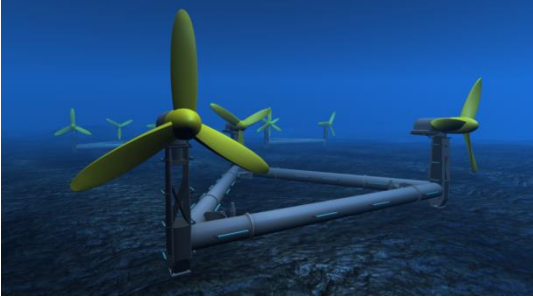
The numbers of each device and the maximum parameters will be identified during the EIA in order to allow the worst case scenario of the design envelope to be assessed for each receptor. Key details that will be identified during the EIA include:

- Maximum number of each device
- Height above the sea surface
- Potential swing/movement of the device about the foundations
- Surface clearance
- Seabed clearance
- Rotor diameter
- Rotor RPM and tip speed
- Foundation type
- Footprint on the seabed

Table 4.1 Examples of Tidal Energy Converters (TEC) which could potentially for part of deployments at the West of Anglesey Demonstration Zone.

Device	Details
<p>Scotrenewables – Scotrenewables Tidal Turbine</p> 	<p>The Scotrenewables device is a floating device which has two horizontal axis turbines mounted, beneath the surface, on a floating hull platform. The turbine blades can be retracted beneath the hull for maintenance purposes</p> <p>The platform is moored to the seabed via 4 seabed anchor points. A power and control umbilical line connects the device to control and grid.</p>
<p>Open Hydro</p> 	<p>The Open Hydro device is an open centre turbine - horizontal axis turbine with two counter rotating fixed pitch rotors and direct drive, permanent magnetic DC rim generators.</p> <p>The turbine is designed to be deployed directly on the seabed, using a gravity foundation and a purpose build barge. The rotors are fabricated largely from glass reinforced composites (GRP).</p>

Device	Details
<p>Tocado BV – Tocardo Aqua 2800</p> 	<p>The Tocardo Aqua 2800 device is a direct drive two bladed turbine, with intelligent speed tuning (stall control), which eliminates the need for pitching mechanisms, while matching the device to a wide range of tidal stream variations. The turbine is being developed in several different formats with different power ratings.</p>
<p>Triton – Tidal Stream Ltd</p> 	<p>The Triton device is a low lying, surface piercing device with a buoyant superstructure attached to seabed, with monopile, pin piles or gravity structure utilising mooring lines or a rigid structure. Can support multiple TECs on a single platform.</p>
<p>Atlantis - AR series</p> 	<p>The AR series turbines are commercial scale horizontal axis turbines designed for open ocean deployment.</p> <p>AR turbines feature a twin rotor set with fixed pitch blades.</p>

Device	Details
<p data-bbox="284 338 576 365">Andritz Hydro Hammerfest</p> 	<p data-bbox="866 338 1401 573">The Andritz Hydro Hammerfest device is a horizontal axis turbine, 3 blade rotor with full pitch control. The device is fully submerged on a gravity foundation. The turbine has a modular design, allowing all critical components to be lifted out of the water in one operation for maintenance and repair.</p>
<p data-bbox="284 786 416 813">SME Plat-O</p> 	<p data-bbox="866 786 1401 880">The SME Plat-O device is a mid water column floating platform that allows multiple turbines to be mounted.</p>
<p data-bbox="284 1240 743 1267">Tidal Energy Limited (TEL) – Delta Stream</p> 	<p data-bbox="866 1240 1401 1435">The DeltaStream device consists of an array of 3 horizontal axis rotors mounted on a frame/platform resting on the seabed. Three turbines on a single, circa 30m wide, triangular frame have a low centre of gravity giving structural stability...</p>

4.3.2 Foundation types

Seabed mounted devices

Seabed mounted devices can be fixed using several different methods. For example, TECs can be mounted directly onto monopiles, or mounted on jacketed foundations that are pinned using pin piles (e.g. Open Hydro See **Table 1.1**). Piling methods are dependent on the nature of the seabed and although piles can be hammered into soft seabed types using a hydraulic hammer, in areas of hard seabed hydraulic piling may

not be appropriate, and in such locations rock sockets may be pre-drilled and grouted pin piles, or screw piles, may be used to anchor the foundation.

As piling and drilling into hard seabed types can be technically challenging, there is also the potential for gravity bases to be used. These would consist of concrete bases attached to a jacket foundation that would act as 'feet' on the jacket structure (**Plate 4.1** Error! Reference source not found.).



Plate 4.1 Gravity base 'foot'. (Image source – Tidal Stream limited)

The type of installation vessel will vary depending on the needs of the foundation, but would typically require a heavy lift crane barge or jack-up barge vessel to undertake hydraulic piling or drilling. Once the pile is installed, it is likely the TEC would be placed in position by a heavy crane vessel.

Gravity base foundations would typically be installed by the foundation being floated or transported by vessel to site and then guided into place by a heavy lift crane vessel, typically under the control of dynamic positioning (DP).

Seabed preparation maybe required prior to foundation installation, this would usually involve either the removal or addition of material in order to level the seabed beneath the foundation. Due to the high hydrodynamic energy environment of the Site it is assumed that the need for scour protection will be minimal, however, this will be assessed in greater detail in the EIA. Any scour protection used would be expected to be rock or concrete mattress.

Floating devices

Floating device types utilise a buoyant support structure on which to mount the TEC. There are several variations of device including; low surface piercing superstructure TECs (e.g. Scotrenewables (See **Table 4.1**) and submerged, mid water column TECs (e.g. SME See **Table 4.1**).

Twin rotor floating device types typically utilise catenary moorings (**Plate 4.2**) and may require up to four gravity anchors. These anchors tend to be in the region of 300 tonnes. Mooring lines are attached to the anchors to hold the TEC support structure in place. Gravity foundations for larger floating platforms may be up to 2000 tonnes with a footprint of up to 360m².

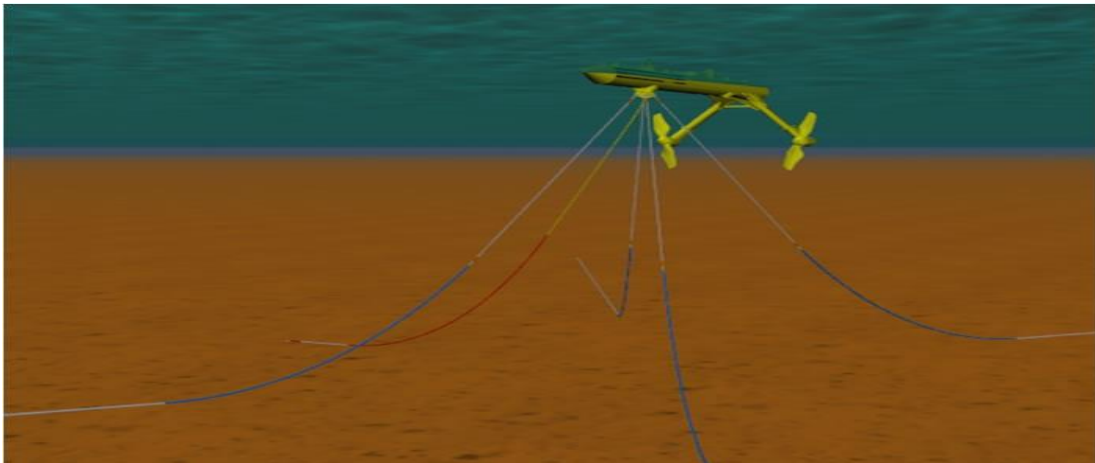


Plate 4.2 Catenary mooring system (Image Source Scotrenewables)

Other support structure designs, typically mid water column devices (e.g. SME) usually have a tensile mooring system to reduce movement. These are typically deployed using 4 anchor points and kept under tension, as opposed to the catenary mooring system which is not held under tension (Plate 4.3 Error! Reference source not found.).

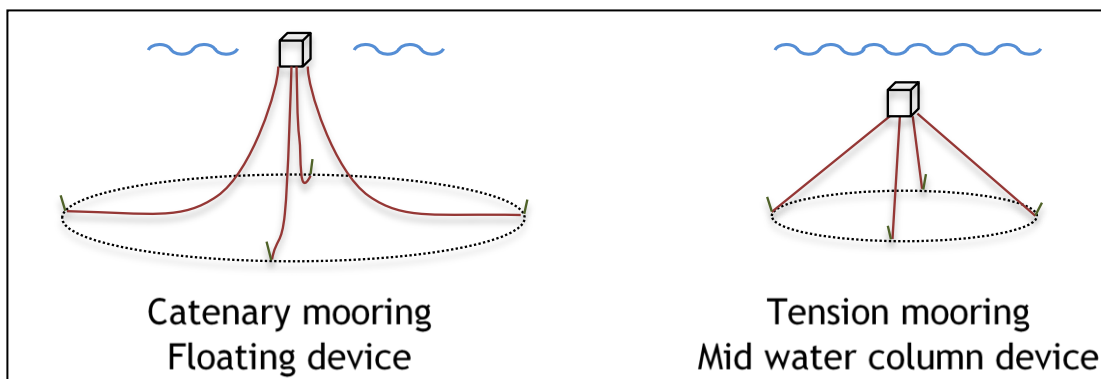


Plate 4.3 Schematic example catenary and tension based mooring systems

4.3.3 Cable and offshore electrical components

The Project will require two main types of subsea cable, inter-array cables, which connect individual devices to the electrical network via offshore electrical hubs, and an export cable, which transports the generated energy to the onshore substation. The following gives a basic overview of the likely electrical components that will be considered during the EIA. Morlais and Minesto are currently discussing a joint approach to the offshore export cable and onshore infrastructure to minimise environmental impacts and the need for individual grid connections.

Inter-Array Cables

Inter-array cables link individual devices within array to a singular point, which aggregates output from all devices prior to exporting via the export cable. The length of inter-array cable required will depend on device and layout of the array. Similarly, the

carrying capacity of the cable would also depend on the individual developer's device layout and requirements, but would typically be between 690V and 11kV.

As the seabed is expected to be rock with little surface sediment it would be expected that inter-array cables would be surface laid and protected where appropriate. Burial of the inter-array cable will also be considered within the EIA.

Offshore electrical hubs

Typically, individual TECs will generate power at 690V, this is then stepped up into an export grid compliant power (6.6kV or 11kV) via a step up transformer in the device nacelle.

Some device developers may require electrical hubs to connect multiple devices. This hub may be developed into one of the device or be a standalone multiple device platform connected to each device. Alternatively, multiple devices may be connected in series (daisy chained).

Where a separate electrical hub is required, it would be expected that this would most likely be surface piercing although submerged hubs may be considered. The foundations and installation methods will be similar to those discussed for the TEC foundations and will typically be mounted on a gravity base, pin-piled or monopiled foundation (for seabed mounted hubs) or anchored for buoyant mid-water or surface piercing hubs.

Offshore export cable

The export cable will transport all power generated by the TEC arrays to the Grid via the onshore infrastructure. Each array (berth) would require a specific export cable which would then be linked to a main export cable via an electrical hub or cable splice where power from all arrays are aggregated for export via the main export cable. Morlais and Minesto are proposing a collaborative approach to the installation of their project export cables. The individual project export cables would merge at an appropriate location and have a single approach to the landfall. The needs of the two projects will dictate the final installation method, however, the main export cable may consist of multiple cables bundled within a single trench or require several single cables within separate trenches. Burial of the export cable will depend on seabed conditions between the offshore hub and the landfall at Penrhos Beach. The export cable will either be buried or surface laid and protected, as appropriate. Both scenarios, and the methods for each, will be fully considered within the EIA.

Installation will require a specialised cable laying vessel with specialised methods needed in shallow waters that the main cable laying vessel may not be able to access the landfall area. There are various methods available for cable laying and a range of appropriate methods will be assessed within the EIA.

4.3.4 Typical device installation sequence

The installation sequence for most devices would be expected to follow the following format;

- A vessel installs the foundation system (where piled this will likely require subsea drilling from a Dynamic Positioning (DP) vessel, or for gravity foundations a heavy lift vessel);
- A suitable vessel installs the support/superstructure;
- A suitable vessel installs the TEC onto the foundation structure; and
- A suitable vessel installs the inter-array cabling and connects to the export cable.

Offshore export cable installation would be expected require the laying of the export cable beneath the seabed surface wherever possible. A cable lay vessel is likely to be used to bury offshore cables. Where it is identified that cable protection is required, cable protection such as concrete mattresses or rock bags maybe used to ensure the cable is protected and prevent snagging.

4.3.5 Onshore infrastructure

Cable landfall

The offshore export cable landfall has not been confirmed but it is anticipated that Penrhos Beach will be the most rational and technically feasible location. There are two main methods typically used for cable installation at land fall;

- Cable burial up an existing beach in an open trench; and
- Horizontal Directional Drilling (HDD).

Given the nature of the environment at the landfall it is anticipated that the most appropriate method of installation is likely to be via an open trench.

Depending on the length of the onshore cable route, a separate onshore cable may or may not be required. For the purpose of this scoping report, it is assumed that a separate length of onshore cable would be required. This would be joined to the offshore export cable near the landfall using a transition pit.

Onshore cable installation is typically undertaken by either plough or a trench and backfill method depending on the soil type. Ploughing requires suitable (softer soils) and causes minimal disturbance. Harder soils may require a trench to be excavated along the cable route, the cable is then placed within the trench and buried to a depth of no less than 1m below ground.

In built-up areas are where the cable route needs to cross obstacles such as major roads the excavation of a trench may not be possible. In these areas HDD may be undertaken to install the cable without disturbing surface infrastructure.

Onshore substation

Although the details of the onshore substation are unknown at this stage, it is likely to consist of the following components;

- A compound with hardstanding which would house a grid transformer and connection terminations;

- A control building for housing switch gear;
- A welfare area which would be likely to consist of a site office and welfare facilities including an area of hardstanding for parking.
- The size of the substation will vary with the design chosen and method of cable entry. Substations from similar developments vary with size and capacity requirements. Other tidal projects have reported substation footprints of between 30m x 9m² and 70m x 50m³, however, there are numerous factors that influence the final footprint, such as;
- Whether an air or gas substation is chosen as the final design. An air insulation based substation would be likely to increase the final footprint;
- The direction the cables enter the substation (vertically or horizontally); and
- The internal layout of the substation. Electrical equipment can be stacked to reduce the overall footprint of the substation but this would increase the overall height of the substation.

There are two general types of substation that govern the overall appearance of the structure, these include;

- A fully enclosed substation where the electrical components are contained within an external structure; or
- An outdoor substation where the electrical components are not contained within a structure.

Grid connection

A grid connection of 13.5 MW capacity has been agreed and Morlais are in the process of seeking an increase in capacity.

A high level 'optioneering' study has highlighted a number of possible routes that the export cables could take. The preferred option is a route to the north of Holy Island making landfall near to the former Anglesey Aluminium works.

Menter Môn is in an advance stage of discussions with Minesto on the approach for sharing a joint offshore export cable and onshore infrastructure between the Project and Minesto's Deep Green Project. These discussions will determine the potential for a shared cable and substation the ultimate responsibility for consenting and installation.

The link to the grid connection between the substation and the grid connection point has not been included within this scoping report as the location of the substation and the location of the grid connection have not been finalised. The Minesto request for Scoping Opinion¹ indicates that depending on the substation option, either SPEN or National Grid Plc will become the grid supplier and that the grid connection point will be determined through detailed design following these decisions.

Access roads

During the onshore cable installation access roads would be required for construction vehicles and personnel to access the construction site. The extent of works depends on

² PTEC Environmental Impact Assessment. Perpetuus, 2014.

³ Brims Tidal Array Environmental Scoping Report Brims Tidal Array Ltd 2013.

the location of the substation itself and the final onshore cable route but may require some alterations or strengthening of London Road (A5) and Penrhos Beach Road to access the land fall area and cable route.

In addition to alterations to existing roads, temporary access roads and laydown areas may also be required to access the cable installation area. These would typically be areas of temporary hardstanding that would be reinstated after the construction phase.

4.4 Operations and maintenance

The level of maintenance activity will be highly dependent on the developers' requirements. A range of operations and maintenance (O&M) activities is anticipated from minor intrusive maintenance to full recovery and replacement of the device. A range of operational and maintenance scenarios will be discussed within the EIA.

4.4.1 Offshore components

The project will have a maximum of a 45 year lifespan. During this period the method of operation and maintenance of devices will be the responsibility of the tenant and maintenance of offshore electrical hubs, inter array cables (between TEC arrays and offshore hub) and export cable route will be the responsibility of Morlais. It is anticipated that once the devices are installed and operational that the systems can be largely monitored and maintained remotely through a central control room, however, offshore O&M activities will be required. Initially, it would be expected that there will be some need to access devices in the field.

The offshore hub(s) (if required) would be likely to be designed to be operated as an unmanned platform. Routine maintenance would be undertaken by either vessel or helicopter transfer. Where major and unexpected maintenance is required, such as the replacement of heavy items, additional vessels such as multi-cat workboats or heavy lift crane vessels might be required.

4.4.2 Onshore components

Maintenance for onshore components is expected to be minimal, with most maintenance taking place at the substation, which will be easily accessible. Emergency access routes to the cable corridor and transition pit may need to be identified for unexpected maintenance.

4.4.3 Decommissioning

Although contractual details have not been finalised, decommissioning of individual devices and arrays is likely to be the responsibility of individual tenants with decommissioning of general infrastructure such as the export cable being the responsibility Morlais.

Decommissioning methodologies would vary considerably between devices but would be expected to be similar to the construction phase in reverse. The EIA envelope will include a full range of likely decommissioning techniques.

5 KEY POLICY AND PLANNING LEGISLATION

The following section outlines the main policy and planning legislation which will be applicable to this project. A full review of applicable planning and policy will be undertaken during the EIA.

5.1 Policy background

Climate change is seen as being one of the greatest environmental challenges facing the world today with increasing pressure to reduce carbon emissions as a way of mitigating predicted increases in average global temperatures.

As a member of the European Union (EU) G8, the UK plays a leading role in tackling climate change at an international level. Through the Kyoto Protocol (1997), the UK had a legally binding target to reduce emissions of greenhouse gases by 12.5% below 1990 levels in the period 2008-2012, this target has now been extended to a 40% reduction (below 1990 levels) in greenhouse gases by 2030.

Renewable energy is seen as a primary method of reducing emissions of greenhouse gases, in particular CO₂. The UK has entered into the EU Renewable Energy Directive (Directive 2009/28/EC)⁴ to deliver national targets and priorities in greenhouse gas reductions as well as our domestic targets of reducing greenhouse gas emissions by 80% by 2050 (UK Marine Policy Statement, 2011⁵).

In addition to the reduction in greenhouse emissions, renewable energy is an important element in working towards a more varied energy mix and increased energy security to insulate the UK against global fluctuations in energy prices. The renewable energy industry has also been an important economic driver helping to create direct and indirect jobs and benefit the wider economy.

Specific measures for renewable energy were set out in the UK Renewable Energy Strategy (RES) which was published in parallel with the UK Low Carbon Transition Plan in July 2009 (DECC 2009a⁶ and 2009b⁷). The RES sets out the path by which the UK can meet the legally-binding target of 15% energy consumption from renewable sources by 2020.

The Renewable Energy Roadmap (DECC 2011⁸, amended in DECC 2012⁹ and DECC 2013¹⁰) updated some of the aims within the RES and identifies eight types of

⁴ EU Renewable Energy Directive 2009/28/EC <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32009L0028> (accessed 27/04/2015)

⁵ UK Marine Policy Statement (2011).

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf

⁶ Department for Energy and Climate Change (DECC) (2009a). The UK Renewable Energy Strategy. Available at: <http://www.official-documents.gov.uk/document/cm76/7686/7686.pdf>. Accessed: 24/04/2015

⁷ Department for Energy and Climate Change (DECC) (2009b). The UK Low Carbon Transition Plan: National Strategy for Climate and Energy. The Stationery Office.

⁸ Department for Energy and Climate Change (DECC) (2011) UK Renewable Energy Roadmap Available at: <http://infrastructure.planningportal.gov.uk/wp->

technology capable of providing 90% of the renewable energy required to meet the UK's 2020 target of 15% of energy consumption derived from renewable sources. It reports that energy from tidal stream devices could make a significant contribution to meeting the UK future energy needs.

5.2 Renewable energy policy Wales

Welsh renewable policy focuses on the transition to a low carbon energy system and maximising the benefits for both Wales and Welsh communities. The policy sets out the Welsh goals for providing an encouraging growth of renewable energy generation within the energy mix whilst ensuring development is pursued in a socially, environmentally and economically responsible manner that is compliant with the policies outlined in the Welsh Government resource management paper; Sustaining a Living Wales¹¹.

The 2012 Welsh Governments policy document, Energy Wales: A Low Carbon Transition outlines the Welsh Governments approach to utilising the marine environment for renewable energy deployment. Marine renewable energy has been identified as a key way of meeting renewable energy objectives, with an aim to capture 10% of the potential tidal stream and wave energy off the Welsh Coastline by 2025.

The Welsh Government has outlined the Anglesey Energy Island Programme which sets out to promote Anglesey as a hub for energy developments such as the Minesto Holyhead Deep project, Wyfla B nuclear power station and Holyhead Biomass Energy Centre. Through this, the Welsh Government is aiming to maximise socio-economic benefits to Anglesey and the wider area. The Morlais Demonstration Zone Project is being developed to maximise local socio-economic benefits where possible.

The Welsh First Minister has recently set up the Energy Wales Unit, who's remit is to build on the policies set out in the 2012 Policy document and focus on progressing marine energy.

content/ipc/uploads/projects/EN010033/2.%20Post-Submission/Application%20Documents/Environmental%20Statement/7.1.2%20Policy%20and%20Legislative%20Context.pdf Accessed: 25/04/2015

⁹ Department for Energy and Climate Change (DECC) (2012). UK Renewable Energy Roadmap Update 2012. Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80246/11-02-13_UK_Renewable_Energy_Roadmap_Update_FINAL_DRAFT.pdf. Accessed: 25/04/2015

¹⁰ Department for Energy and Climate Change (DECC) (2013). UK Renewable Energy Roadmap Update 2012. Available at: <https://www.gov.uk/government/publications/uk-renewable-energy-roadmap-second-update>. Accessed: 25/04/2015.

¹¹Welsh Government 2012. Sustainable Living Wales <http://www.cewales.org.uk/cew/wp-content/uploads/Sustaining-a-Living-Wales-Document.pdf>

5.3 Planning policy and legislation

5.3.1 UK planning legislation

Planning Act 2008

The Morlais Demonstration Zone Project is seeking consent for a demonstration site of less than 100MW and therefore not considered a Nationally Significant Infrastructure Project (NSIP). As the project does not constitute an NSIP, the Department for Energy and Climate Change (DECC) Development Consent Order (DCO) planning regime is not applicable and the project would seek consent as a power generating station under Electricity Act 1989²⁰.

Electricity Act 1989

The purpose of the Project is to install and operate power generating infrastructure. Under Section 36 consent of the Electricity Act 1989, consent from the Secretary of State is required to construct, extend or operate a generating station with a capacity of greater than 50MW, this was further extended via a Statutory Order (SI2001/3642) to include all offshore wind or wet developments of 1 MW or greater capacity in UK territorial waters. Para 12.8.21 of the Planning Policy Wales document states that 'Offshore renewable energy developments over 1MW require consent from the Marine Management Organisation (MMO)'.

5.3.2 Planning policy in Wales

Planning policy for Wales is set out in the document Planning Policy Wales (Welsh Government, 2014). The planning policy document outlines the Welsh Governments approach to facilitating the delivery of the aims set out in Energy Wales: A Low Carbon Transition as well as UK wide and European renewable energy targets, including obligations under the Renewable Energy Directive (2009/28/EC⁴).

The Planning Policy also takes into consideration meeting the aims of the aims of Sustaining a Living Wales¹¹ document to ensure that development does not take precedent and impact on other factors.

The policy encourages a positive approach to the development of renewable and low carbon energy development and encourages collaboration where possible.

Planning Policy Wales (2014, Para 12.8.17¹²) states that 'Strategic scale renewable energy projects of 50MW or over are currently consented by the UK Government, advised by the National Infrastructure Directorate within the Planning Inspectorate. Ancillary consents, associated with proposed developments over 50MW continue to be determined within Wales'.

¹² Welsh Government, (2014) Planning Policy Wales
<http://gov.wales/topics/planning/policy/ppw/?lang=en>

5.3.3 Marine spatial planning

Since September 2014 the Maritime Spatial Planning Directive (MSPD) has been in effect. The directive requires EU countries to draw up maritime spatial plans no later than 31st March 2012¹³. These plans will enable public authorities to organise human activities in marine areas ensuring efficiency and sustainability of ecological, economic and social objectives.

The Welsh Government is currently developing the first marine plan for Welsh inshore and offshore waters, the Welsh National Marine Plan (WNMP)¹⁴. The Plan is being developed in accordance with the Marine and Coastal Access Act 2009 (MCAA)¹⁵, the UK Marine Policy Statement⁵ (2011) (MPS) and the Maritime Spatial Planning Directive (EU Directive 2014/89)¹⁶.

Until the WNMP comes into act, the MCAA, MSP and MSPD will be adhered to. All public authorities are to take into account the MPS and relevant Marine Plans when making decisions in regard to the marine area. This ensures that marine resources are used in a sustainable way in line with the high level marine objectives¹⁷.

5.3.4 The Marine Coastal and Access Act 2009

The Marine Coastal and Access Act 2009 (MCAA) introduced a new system for marine planning in the marine and coastal environment in England and Wales. Under the MCAA, a Marine License is required from the Marine Management Organisation (MMO) for installing a development of less than 100MW within territorial waters.

Marine Conservation Zones (MCZs) represent a network of marine protected areas (MPAs) provided for under the MCAA. The first tranche of MCZs was designated in November 2013 and a second tranche of potential sites to go forward for public consultation in 2015 was announced in February 2014. The primary aim of MCZs is to deliver the Government's vision for an 'ecologically coherent network of MPAs across the UK and to ensure the health of the wider UK marine environment'. These sites are intended to protect habitats and species not necessarily covered by existing mechanisms and complement the existing MPA network designated under the Habitats and Birds Directives (see below). Once designated, the protection and maintenance of MCZs will be enforced by the MMO.

¹³ http://eur-lex.europa.eu/legal-content/EN/LSU/?uri=uriserv:OJ.L_.2014.257.01.0135.01.ENG

¹⁴ Welsh Government, 2014 Welsh Marine Planning Policy.

<http://gov.wales/docs/desh/consultation/140203marine-planning-public-participation-statement-en.pdf>

¹⁵ Marine and Coastal Access Act, 2009 <http://www.legislation.gov.uk/ukpga/2009/23/contents>

¹⁶ <http://gov.wales/topics/environmentcountryside/marineandfisheries/marineplanning/?lang=en>

¹⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf

5.3.5 Environmental Impact Assessment

The Electricity Works (Environmental Impact Assessment) (England and Wales) (amendment) Regulations 2007¹⁸ is the UK legislation responsible for transcribing the European EIA Directive 1995 (as amended, 2009) into UK law. The legislation requires an assessment be carried out to determine the environmental effects of certain public and private projects. The construction, extension and operation of power generating stations, as defined in Section 36 of the Electricity Act falls under this criteria. As the proposed development is over 1MW it will require Section 36 Consent and is included within Schedule 2 of the Electricity Works (EIA) Regulations.

Under Regulation 7 of the Electricity Works (EIA) Regulations, a developer can request a scoping opinion from the Secretary of State before submitting a Section 36 consent. The purpose of seeking a scoping opinion is to provide the developer with a written record of what, in the opinion of the Secretary of State, should be included in the Environmental Statement.

This document is being submitted to request a formal scoping opinion. This document provides, as requested under Regulation 7, a summary of relevant information on the proposed development including:

- (a) a plan sufficient to identify the site which is the subject of the proposed development;
- (b) a brief description of the nature and purpose of the proposed development and of its possible effects on the environment; and
- (c) such further information or representations as the person making the request may wish to provide or make

When the Secretary of State provides a scoping opinion, they must formally state what information should be included in the Environmental Statement and provide justification.

EIA regulations guidance also recommend that the developer submit a draft outline of the Environmental Statement, giving an overview of what the main issues are considered to be.

Once all the necessary information has been provided to the Secretary of State, the Secretary of State is required to consult with the Consultative Bodies to seek their opinion. For the Morlais Demonstration Zone Project, this would be National Resources Wales (NRW). In addition, the Secretary of State can consult with other organisations if it deemed appropriate.

The Marine Works (Environmental Impact Assessment) (Amendments) Regulations 2011¹⁹

These Regulations implement the European Commission's EIA Directive (85/337/EEC), referring to Annex I projects that require mandatory EIA and Annex II projects which may be subject to an EIA, should certain thresholds be exceeded. The Marine Works

¹⁸ Electricity Works (EIA) (England & Wales) Regulations 2007 (Amended)
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43576/Electricity_Works_EIA_Regulations_-_guidance.pdf

¹⁹ The Marine Works (Environmental Impact Assessment) (Amendments) Regulations 2011

Regulations are similar to the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000, but apply the legislation in relation to Marine Licences. As part of the EIA the potential for cumulative impacts with other projects must also be considered.

Consenting strategy

5.3.6 Section 36

Section 36 consent under the Electricity Act, 1989²⁰ will be required for offshore generators, inter-array cables, offshore electrical infrastructure, export cable up to the land fall area. Section 36 consent is issued by the Secretary of State.

5.3.7 Terrestrial planning

Onshore components of the project will require consent under the Town and Country Planning Act, 1990 (TCPA)²¹. This would include the cable route above low water, the onshore substation and any infrastructure between the substation and Grid connection (not included in this scoping report). The Isle of Anglesey Council would be responsible for applications made under the TCPA. It is assumed that a Pre-Application Consultation (PAC) is not required as The Development does not constitute a major project.

5.3.8 Marine Licence

It is assumed that all components of the project below Mean High Water Springs (MHWS) will require a Marine Licence issued by the Marine Management Organisation (MMO).

5.3.9 Other licences

There is a potential for other licences to be required, for example Licence to disturb European Protected Species (EPS) and Controlled Activities Regulations (CAR) Licence.

Public consultation will be undertaken for the project as a whole and include both offshore and onshore components.

²⁰ Electricity Act, 1989 <http://www.legislation.gov.uk/ukpga/1989/29/contents>

²¹ TCPA, 1990 <http://www.legislation.gov.uk/ukpga/1990/8/contents>

6 PHYSICAL ENVIRONMENT

6.1 Metrocean conditions and coastal processes

This section discusses Meteorological, Oceanographic and Coastal Processes in the Offshore scoping area. Far-field effects on the coastal area adjacent to the offshore scoping area have also been considered.

6.1.1 Baseline

Oceanography

The waters around the offshore scoping area are considered dynamic in terms of oceanographic conditions and sediment transport. The wave climate on the site is variable and highly dependent on weather conditions. The dominant swell direction is from the southwest whilst wave driven waves are usually from an either southwest or westerly direction.

Current speeds are variable across the site and can reach up to 3 m/s mean spring peak velocity. Water depths across the site vary but are generally around 40m, although a depression in the seabed known as Careg Hen reaches 56m at its deepest point.

Meteorological conditions

The predominant wind directions recorded at Anglesey are south and southwest with a yearly average of 40% of winds coming from those directions (based on historical data from 1974 to 2012²²). Daily mean wind speeds are recorded as between 8 m/s (in January and 5m/s (in July) with 13m/s recorded as the highest daily maximum in January and 1.75m/s recorded in April²².

Daily average temperatures range from between 4°C and 19°C with August being the warmest month on average and February being the coolest.

The median cloud cover is between 80% and 90%, the predominant precipitation type is moderate rain (76% of precipitation) and the probability of precipitation on a single day ranges from 58% to 76%²².

Physical processes

The west coast of Holy Island is predominantly west facing and is exposed to significant wave action from a southwest direction which drives coastal processes along the coast. Coastal erosion has been an ongoing problem in the coastal area around Trearddur Bay resulting in the implementation of a coastal protection scheme in this area. This protection scheme includes the construction of a new sea wall.

Physical processes along the Holy Island coastline are constrained by the presence of hard rock headlands with bays forming from the cutting into of glacial infill, these hard headlands dictate the dissipation of wave energy causing variations between sandy

²² WeatherSpark. <https://weatherspark.com/averages/28745/Anglesey-Wales-United-Kingdom>
Accessed 23/04/2015

bays and exposed rock foreshores. The formation of individual bays and manmade coastal structures cause localised changes in transport systems which influence both the bay and backshore shape. Areas of softer sediment and clay cliffs tend to erode quicker resulting in wider sandy bays²³.

6.1.2 Potential impacts

Table 6.1 Potential impacts on metocean conditions and coastal processes

Potential impact	Phase	Anticipated significance	Comment
Changes to sediment transport system by changes in wave and current climate.	Operational	Significance of Impact Unknown.	Changes in met-ocean conditions are not expected to deviate significantly from base line conditions and therefore little or no change to sediment transport systems are expected. This will be confirmed through the EIA.
Increased suspended sediment from reduced water energy.	Operational	Significance of Impact Unknown.	Although not expected to be a significant impact, removal of tidal energy from the environment may result in increased sedimentation down stream of TEC devices.
Changes to coastal erosion.	Operational	Significance of Impact Unknown.	Changes to local hydrodynamic regime, in particular, changes to tidal energy and wave directions may result in changes to coastal the coastal erosion regime on the west coast of Holy Island, adjacent to the offshore scoping area.

6.1.3 EIA baseline characterisation

In order to inform the EIA baseline data gathering will focus on the following data gaps;

- Fine detailed information regarding hydrodynamic and coastal process within the site and adjacent coastal area. This could be done through a combination of a thorough review of available data such as Shoreline Management Plans and coastal defence management plans as well as coastal process modelling.
- Further data regarding wave climate to determine likelihood of impacts to wave climate from surface piercing infrastructure and the impact this may have on coastal processes.

²³ Shoreline Management Plan (2011), Policy Development Coastal Area G.

6.2 Marine sediment and water quality

This section discusses the marine sediment and water quality conditions within the offshore scoping area and adjacent Holy Island coastal area.

6.2.1 Baseline

Water quality

Coastal waters

There are eight bathing water beaches along the west coast of Anglesey, all of which meet the higher water quality standard²⁴ and have consistently met the higher standard since 2010. There are five beaches adjacent to the Site, Porth Darafach, Borth Wren, Trearddur Bay, Silver Bay Rhoscolyn and Rhosneiger.

The water catchment areas have a mix of rural, residential and commercial use but are predominantly rural in nature. Water catchment areas typically have a low level of sewage and industrial run-off. There are no known issues with agricultural run-off known²⁴.

Offshore waters

There is no site specific information on water quality. The offshore area has a dynamic hydrological regime with a varied wave regime and a strong tidal regime that provides the site with high levels of mixing and dispersal. Given the low level of industrial activity in adjacent coastal areas and dynamic hydrological regime, it is anticipated that water quality offshore will be good.

Sediment quality

Coastal waters

Sources of sediment input to the coastal area are generally low, although periods of heavy rain increase surface run-off from rural and populated land, increasing riverine and coastal suspended sediment levels. However, sources of contaminated sediment are limited and no sources that would cause significant sediment contamination have been identified.

Offshore waters

Little is currently known about the sediment quality further offshore. The proportion of fine sediments within the Scoping Area is expected to be low, with mainly coarse sediments and rock being present due to the presence of strong hydrological regimes. The coarse sediment type, dynamic nature of the oceanographic data and the rural nature of the coastal area would suggest that there are likely to be low levels of contamination within the site.

²⁴ CCW/Environment Agency. Bathing Water Quality Monitoring Interactive Map <http://environment.data.gov.uk/bwq/profiles/>

6.2.2 Potential Impacts

Table 6.2 Potential impacts on marine sediment and water quality

Potential impact	Phase	Anticipated significance	Comment
Increase in suspended sediment.	Construction	Potential significance unknown.	Increased sedimentation leading to smothering of surrounding habitats or release of contaminated sediments is very unlikely in a tide-swept area or will be rapidly dispersed due to tidal flows. The tidal flows will also reduce any smothering potential due to increased dilution and dispersion rates.
Removal of surface sediment through scour.	All	Potential impact significance unknown.	The presence of seabed structures has the potential to result in scour of surface sediments. Although, it is expected that the site will largely consist of coarse sediments and rock, the likelihood of scour is likely to vary across the site and with technology foundation type.
Contamination of the offshore water environment.	Construction and operation	Not significant once standard industry guidelines are implemented.	There is the potential for accidental release of fluids in to the environment through both construction and operational phases. The risk of this is managed through the implantation of industry standard industry best practice guidelines will be followed at all times e.g. appropriate use of chemicals, spill response, marine pollution contingency plans and pollution prevention guidelines (PPGs) Risk of pollution not deemed to be significant.
Contamination of marine sediments.	Construction and operation	Effect unlikely to be significant.	Industry best practice guidelines will be followed at all times e.g. appropriate use of chemicals, spill response, marine pollution contingency plans and PPGs, in

Potential impact	Phase	Anticipated significance	Comment
			particular PPG1 and PPG5.. Risk of contamination not deemed to be significant.

6.2.3 EIA Baseline characterisation strategy

In order to inform the EIA baseline site the following data gaps would be focused on;

- Baseline sediment contamination conditions in the offshore scoping area. This would be done through a review of literature and data such as the Clean Seas Environmental Monitoring Programme (CSEMP)²⁵ It is likely that site specific sediment contaminant sampling would also be undertaken during the EIA.
- Baseline water quality conditions within the offshore scoping area. This would be done through a review of available literature.

6.3 Geology, geomorphology, soils and hydrology

This section outlines the onshore geology, geomorphology, soils and hydrology within the onshore scoping area and adjacent environment.

6.3.1 Baseline

Geology

Anglesey is an important geological feature and is a key area in the UK for understanding large-scale tectonic processes that were responsible for the formation of southern Britain. Anglesey is a classic example of glacial landforms caused by fast flowing glaciers meeting the Irish Sea ²⁶. Due to its significant geology status, parts of Anglesey are designated as a Geopark.

The geology of the onshore scoping Area falls into two main geological formations, the South Stack Group and the New Harbour Group²⁷. Bed rock on Holy Island consists of mainly Pre-Cambrian rocks, notably the Mon Complex. These rocks have been deformed under pressures and interbedded with lavas, ashes and tuffs ²⁸. The location of the onshore cable route and substation would be in an area of low lying coastal land which overlies the New Harbour Group formation.

²⁵ BODC CSEMP Interactive Map

http://www.bodc.ac.uk/projects/uk/merman/assessments_and_data_access/csemp/

²⁶ British Geological Society <http://www.bgs.ac.uk/research/ukgeology/angleseyNorthWales.html> Accessed 22/04/2015.

²⁷ Kawai, T., Windiey, B.F., Terabayashi, M., Yamamoto, H., Maruyama, S., Isozaki, Y., (2006): Mineral isograds and zones of the Anglesey blueschist belt, UK: implications for the metamorphic development of a subduction-accretion complex. *Journal of Metamorphic Geology* **24**, pp. 591-602.

²⁸ Davies B.L., 1972 'Geology'. In Richards (ed), 9-10

Geomorphology

The Holyhead and Penrhos areas of the onshore scoping area are typically flat coastal areas that were created through glaciation that formed the Holy Island Strait between Holy Island and the main Anglesey Island.²⁹ Inland of the coastal area, the land within the Scoping Area is rural agricultural land with a low topographical profile.

Typically, the coastal area of Holy Island consists of hard rock outcrops interspersed with sandy bays. Areas of softer clay are found around the southern area of the west coast, to the north of Rhosneigr and Holyhead Bay, where large expanses of sandy beach are present. The area to the south of Holy Island south, just north of Rhosneigr consists of low lying land with a fronting sand dune system. The easterly facing coastal area around Holyhead and Penrhos is typically low lying with soft sediment, sandy bays and clay cliffs.

The formation of individual bays and manmade coastal structures deflect wave energy resulting in localised changes in local transport systems which influence both the bay and backshore shape²³. Areas of softer sediment and clay cliffs around estuaries tend to erode more rapidly than rocky headland resulting in wide sandy bays bordered by rock headland and exposed rocky shorelines.

6.3.2 Soils

There is little site specific information on soils available. Data from previous studies within the onshore scoping area suggests that the region is typically made up of a thin layer of topsoil 0-0.5m in depth which overlies either glacial deposit or silts and clays. Bedrock is typically 1.5-2m below the ground level³⁰.

6.3.3 Hydrology

There are no major rivers or onshore hydrological features within the scoping area, however, a review of map data suggests that there are some smaller hydrological features in the Scoping Area, in particular inland of London Road is a potential location for the cable route. It is anticipated that hydrological features in the Scoping area would be small drainage or streams flowing to the coast.

6.3.4 Potential impact

Table 6.3 Potential impacts on geology, geomorphology, soils and hydrology

Potential impact	Phase	Anticipated significance	Comment
Impact to geology features.	All	Negligible	Due to the nature of the work, it is not anticipated that there will be an impact on geological features from the

²⁹ CCW (Date Unknown) Sensitivity of seascapes in Wales to offshore development. No 10 The Holy Island Strait

³⁰ Atkins 2006. Land at Ty Mawr, Holyhead Anglesey- Archaeological watching brief Report number 656.

Potential impact	Phase	Anticipated significance	Comment
			onshore works. Excavation for onshore works would be expected to be within surface soils.
Impacts to geomorphology (and topography)	All	Negligible	Excavation of the onshore cable route and groundworks for the substation are likely to be undertaken in areas that are already modified. Once buried, the ground level of the cable route would be returned to near baseline conditions. Therefore it is not anticipated that there would be an impact on geomorphology or topography.
Compaction and degradation of soils	Construction	Significance of impact unknown	Due to the need for excavation works during the onshore cable route there will be a requirement to disturb surface soils. This can result in compaction and degradation of excavated soils, particularly topsoil. The extent of the significance would be influenced by the final locations and construction methodology used. In addition, construction plant activities may also cause compaction of soils in the surrounding working area.
Changes to hydrology	All	Significance of impact unknown	The cable route may need to cross hydrological features such as streams or drainage channels, particularly around London Road. The impacts of this will be dependent on construction methodology, location and nature of hydrological features in the development area.

6.3.5 EIA Baseline characterisation strategy

The EIA baseline will be informed through addressing the following data gaps;

- Site specific description of soils. It is likely that this would be undertaken through a combination of desk review, site visit and geophysical site investigations.
- Detailed information regarding hydrological features that may be impacted by the Development. This would include ground water flow, surface water flow, drainage and flood risk.
- A review of potential impacts in terms of the Water Framework Directive and would consider morphological, ecological and chemical aspects of onshore water receptors and coastal receptors within 1nm of the coastline. The potential requirement for a WFD Compliance Assessment will be reviewed.

7 DESIGNATED SITES AND BIOLOGICAL ENVIRONMENT

7.1 Natural Heritage Designated Sites

This section outlines the natural heritage designated sites with the potential to be impacted by The Development due to the wide ranging nature of ecological receptors such as ornithology and marine mammal receptors, an initial search area of up to 50km has been used for these receptors. Guidance provided by NRW (2014³¹ and 2015³²) have been used to identify potential Natural Heritage (and other) receptors.

7.1.1 Baseline

Anglesey and the wider area are important areas for natural heritage due to the wide variety of environments and largely undisturbed environment. **Figure 7.1** shows biological designations around Holy Island and the wider Anglesey and north west Wales area.

Receptors such as ornithology, marine mammals and migratory fish have the potential to be present in areas considerable distances from their origin site.

Table 7.1 provides a list of designated sites that have been identified as potentially requiring consideration.

³¹ National Resource Wales Draft Advice on scoping an Environmental Impact Assessment (EIA) for marine renewable energy development.s

³² National Resources Wales (2015) Checklist of Natural Heritage Tidal Stream energy demonstration zone West of Holy Island, Anglesey.

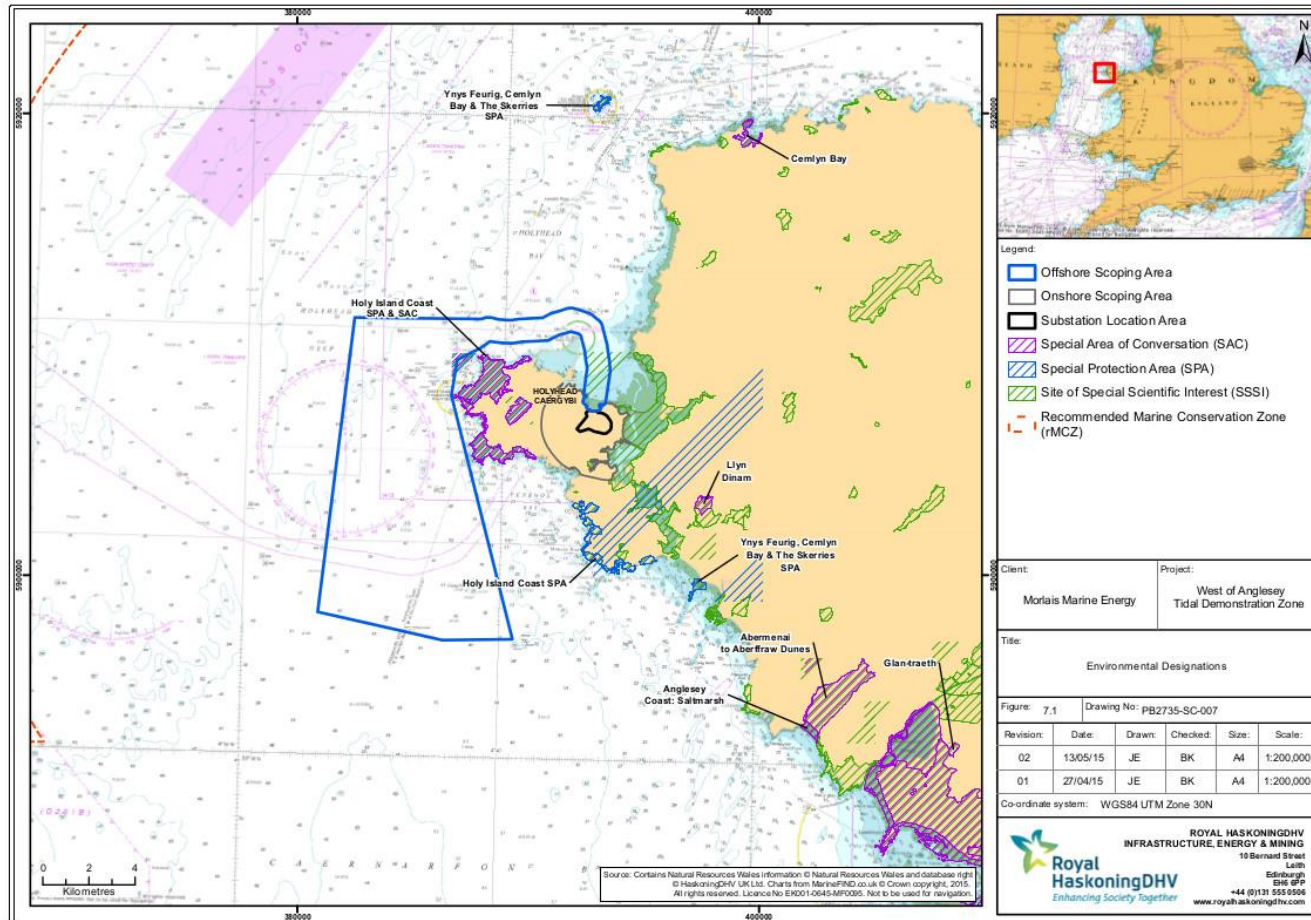


Figure 7.1 Designated Biological Sites within the Holy Island and surrounding Anglesey area.

Table 7.1 Summary of designated sites.

Name of designation	Designation Type	Features	Potential Impacts
Holy Island Coast	SAC	Vegetated sea cliffs Northern wet heaths European dry heaths	No impact anticipated
Cors Heli	SAC	Estuaries Saltmarshes Atlantic saltmeadow <i>Salicornia</i> Other annuals colonising mud and sand	No impact anticipated
Cemlyn Bay	SAC	Coastal lagoons Perennial vegetation of stony banks	No impact anticipated
Abermenai to Aberffraw Dunes	SAC	Dune grassland and vegetation Shifting dunes Dune slacks Natural eutrophic lakes	No impact anticipated
LLŷn Dinam	SAC	Natural eutrophic lakes	No impact anticipated
Pen LLŷn a'r Sarnau	SAC	Annex I habitats: sandbanks which are slightly covered by seawater all the time, estuaries, coastal lagoons, large shallow inlets and bays, reefs. Additional Annex I habitats present - Mudflats and sandflats not covered by seawater at low tide, <i>Salicornia</i> and other annuals colonising mud and sand, Atlantic salt meadows, submerged or partially submerged sea caves. Annex II species, not primary reason for site selection: Bottlenose dolphin, otter and grey seal	<ul style="list-style-type: none"> - Disturbance - Effects of underwater noise - Effects of habitat loss - Collision risk (devices and vessels) - Indirect effects such as changes to habitat or availability/distribution of prey species
Cardigan Bay	SAC	Breeding population of bottlenose dolphins (<i>Tursiops truncatus</i>)	Marine mammals

Name of designation	Designation Type	Features	Potential Impacts
		<p>Additional Annex I habitats present - sandbanks which are slightly covered by seawater all the time, reefs and sea caves</p> <p>Additional Annex II species present – sea lamprey, river lamprey, grey seal</p>	<ul style="list-style-type: none"> - Disturbance - Effects of underwater noise - Effects of habitat loss - Collision risk (devices and vessels) - Indirect effects such as changes to habitat or availability/distribution of prey species <p>Fish</p> <ul style="list-style-type: none"> - Effects of Electromagnetics Fields (EMF); - Effects of underwater noise - Barriers to migration routes; - Collision risk with devices; - Effects of habitat loss; - Indirect effects such as changes to habitat or availability/distribution of prey species.
Pembrokeshire Marine	SAC	<p>Annex I habitats: estuaries, large shallow inlets and bays, reefs.</p> <p>Additional Annex I habitats present – sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, coastal lagoons, Atlantic salt meadows, submerged or partially submerged sea caves.</p> <p>Annex II species: Grey seal and shore duck.</p> <p>Annex II species, not primary reason for site selection: Sea lamprey, river lamprey and Allis</p>	<ul style="list-style-type: none"> - Disturbance - Effects of underwater noise - Effects of habitat loss - Collision risk (devices and vessels) - Indirect effects such as changes to habitat or availability/distribution of prey species

Name of designation	Designation Type	Features	Potential Impacts
Dee Estuary	SAC SPA	shad Annex I habitats: mudflats and sandflats not covered by seawater at low tide, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows. Additional Annex I habitats present – Estuaries, annual vegetation of drift lines, vegetated sea cliffs of the Atlantic and Baltic Coasts, Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria, fixed coastal dunes with herbaceous vegetation, humid dune slacks. Annex II species; not primary reason for site selection: Sea lamprey, river lamprey and Petalwort. Extensive intertidal sand, mudflats and salt marsh. Supports: <ul style="list-style-type: none"> - Ducks and waders during winter; - Breeding colonies of two species of terns during summer; - Wader and sandwich terns during migration periods. 	<p>Fish</p> <ul style="list-style-type: none"> - Effects of Electromagnetic Fields (EMF); - Effects of underwater noise - Barriers to migration routes; - Collision risk with devices; - Effects of habitat loss; - Indirect effects such as changes to habitat or availability/distribution of prey species <p>Birds:</p> <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
River Dee and Bala Lack	SAC	Annex I habitats: Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachium vegetation. Annex II species, Atlantic salmon and floating water-plantain	<p>Fish</p> <ul style="list-style-type: none"> - Effects of Electromagnetic Fields (EMF); - Effects of underwater noise - Barriers to migration routes;

Name of designation	Designation Type	Features	Potential Impacts
		Annex II species; not primary reason for site selection: Sea lamprey, brook lamprey, river lamprey, bullhead and otter	<ul style="list-style-type: none"> - Collision risk with devices; - Effects of habitat loss; - Indirect effects such as changes to habitat or availability/distribution of prey species
Afon Eden – Cors Goch Trawsfynydd	SAC	Annex I habitats not primary reason for site selection: Active raise bogs Annex II species, Freshwater pearl mussel and floating water-plantain Annex II species; Atlantic salmon and otter	Fish <ul style="list-style-type: none"> - Effects of Electromagnetic Fields (EMF); - Effects of underwater noise - Barriers to migration routes; - Collision risk with devices; - Effects of habitat loss; - Indirect effects such as changes to habitat or availability/distribution of prey species
Afon Gwyrfai a Llyn Cwellyn	SAC	Annex I habitats; Oligotrophic to mesotrophic standing waters with vegetation of the Littorelleta uniflorae and/or of the Isoëto-Nanojucetea, water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation. Annex II species, Atlantic salmon and floating water-plantain Annex II species; otter	Fish <ul style="list-style-type: none"> - Effects of Electromagnetic Fields (EMF); - Effects of underwater noise - Barriers to migration routes; - Collision risk with devices; - Effects of habitat loss; - Indirect effects such as changes to habitat or availability/distribution of prey species
Holy Island Coast	SSSI	Heathland Maritime grassland communities Coastal cliffs and ledges Vascular plants	Botanical communities (<i>Tephrosia integrifolia</i> subsp. <i>Maritima</i>) will be a significant consideration in decisions about the siting and location of any onshore development and infrastructure associated with demonstration zone.

Name of designation	Designation Type	Features	Potential Impacts
	SPA	Birds - <i>Pyrrhocorax pyrrhocorax</i> (migratory; breed and winter). Invertebrates Solid geology	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Rhoscolyn Coast	SSSI	Geological – polyphase fold structures Biological Botanical – various heathlands Ornithological – Breeding: <i>Pyrrhocorax pyrrhocorax</i> and <i>Falco peregrinus</i> Marine biological – diverse algal communities	No impact anticipated
Rhoscolyn Reedbeds	SSSI	Area of reedbed and tall fen behind small dune ridge.	No impact anticipated
Rhosneigr	SSSI	Geological – non-cylindrical folding in an Ordovician greywacke sequence.	No impact anticipated
Rhosneigr Reef SSSI	SSSI	Group of rocks and flanking reefs with extensive areas of intertidal bedrock and sandy sediments within the site. High diversity of littoral and shallow sublittoral algae.	<ul style="list-style-type: none"> - Physical effects caused by footprint of any cable landfall cables and cable protection; - Effects due to changes in hydrodynamics and sediment processes; - Effects of sediment plumes created during construction / scour around devices and cables; - Effects on benthic communities of any anti-fouling methods; - Effects on intertidal communities due to accidentally introduction of invasive alien species.

Name of designation	Designation Type	Features	Potential Impacts
Tre Wilmot	SSSI	Range of heathland vegetation communities	No impact anticipated
Porth Diana	SSSI	Coastal heath Large population of <i>Tuberaria</i>	No impact anticipated
LLŷn Traffwl	SSSI	Small shallow lake, supports overwintering wildfowl and aquatic flora	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Valley Lakes	SSSI	Open water areas with mesotrophic marshland and damp grassland habitats. Supports overwintering wildfowl, breeding wetland birds and rich aquatic flora and fauna	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Beddmanarch-Cymyran	SSSI	Comprises of mudflats and sandflats with large areas of seagrass and rare dune heathland. Area supports wide range or wintering water-birds.	<ul style="list-style-type: none"> - Physical effects caused by footprint of any cable landfall cables and cable protection; - Effects due to changes in hydrodynamics and sediment processes; - Effects of sediment plumes created during construction / scour around devices and cables; - Effects on benthic communities of any anti-fouling methods;

Name of designation	Designation Type	Features	Potential Impacts
			- Effects on intertidal communities due to accidentally introduction of invasive alien species.
Ty Croes	SSSI	Coastal heathland, grassland and associated rock and flush habitats with marsh fritillary butterfly.	No impact anticipated
Tywyn Aberffraw	SSSI	Large and intact calcareous dune system with dune ridges, damp slacks and dune grassland with a shallow lake and outflow stream. Supports vast range of specialised flora and fauna.	No impact anticipated
Penrhynoedd Llangadwaladr	SSSI	Exposed rocky coast, sub-maritime grassland, sand dune and dune grassland supporting rare plants and seabird colonies (lesser black-beaked and herring gulls)	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
LLŷn Maelog	SSSI	Shallow basin eutrophic lake, supports various aquatic vegetation and wintering wildfowl, wader species, breeding waterfowl and Freshwater mussels.	No impact anticipated
Newborough Warren	SSSI	Coastal landforms and processes controlling beach and dune development, number of intertidal and coastal features (including sand dunes), supports number of rare plants, insects and bird species. Red squirrels are present in the woodland. Best examples of ancient pillow lavas preserved in Britain.	No impact anticipated
Cemlyn Bay	SSSI	Tidal lagoon and shingle ridge, supports breeding	Birds:

Name of designation	Designation Type	Features	Potential Impacts
		terns and wintering wildfowl. Managed by North Wales Trust.	<ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Skerries	SSSI	Supports largest breeding colony of arctic terns in Wales along with varying terns and gulls.	
Ynys Feurig	SSSI	RSPB reserve Largest breeding terns colony in Wales.	
Ynys Feurig, Cemlyn Bay and the Skerries	SPA	Migratory terns; breeding <i>Sterna dougallii</i> <i>Sterna hirundo</i> <i>Sterna paradisaea</i> <i>Sterna sandvicensis</i>	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Liverpool Bay	SPA	Marine site supports red-throated diver and common scoter.	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Traeth Lafan	SPA	Local Nature Reserve; Supports wintering waterbirds, especially Oystercatchers. Great crested grebes found here for their autumn moult.	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss;

Name of designation	Designation Type	Features	Potential Impacts
			<ul style="list-style-type: none"> - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Puffin Island	SPA	Breeding colony of Cormorant (<i>Phalacrocorax carbo</i>). Supports various seabirds 9puffins, razorbills, guillemots, black guillemots,	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Dyfi	SPA	Wintering area for Greenland White-fronted Goose.	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Grassholm	SPA	Supports breeding Gannets during summer.	Birds: <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or

Name of designation	Designation Type	Features	Potential Impacts
			<p>availability/distribution of prey species;</p> <ul style="list-style-type: none"> - Effects of lighting
Skomer and Skokholm	SPA	<p>Supports breeding seabirds; petrels, gulls and auks. Resident species; chough and short eared owl.</p>	<p>Birds:</p> <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Aberdaron Coast and Bardsey Island	SPA	<p>Supports Chough populations throughout breeding and wintering. Breeding colonies of Manx Shearwaters</p>	<p>Birds:</p> <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting
Cors Fochno and Dyfi Estuary Ramsar	Ramsar	<p>Estuary with adjoining saltmarsh, sand dunes and unmodified actively growing raised mire. Supports varying flora and fauna. Wintering; Greenland white fronted goose and wigeon. Also shelduck, teal, red-breasted merganser, curlew, red-throated divers, great crested grebes and various birds of prey.</p>	<p>Birds:</p> <ul style="list-style-type: none"> - Disturbance; - Effects of habitat loss; - Collision risk with devices; - Indirect effects such as changes to habitat or availability/distribution of prey species; - Effects of lighting

Name of designation	Designation Type	Features	Potential Impacts
Isle of Anglesey	AONB (Area of Outstanding Natural Beauty)	<ul style="list-style-type: none"> - Low cliffs alternating with coves and pebble beaches; - Sheer limestone cliffs interspersed with fine sandy beaches. - Stretches of sand dunes with beaches. 	<ul style="list-style-type: none"> - Assessment of effect the development would have on visual receptors, whether positive or negative, to what magnitude and the significance of this. - Explanation of how potentially negative visual impacts have been minimised during the design process and how remaining negative visual impacts are to be mitigated for. - Illustrations of proposed developments, with photomontages from key viewpoints. Should include popular viewing locations, elevated viewing locations, higher ground viewpoints from the hills or designated landscapes, the effect of morning, high sun and low evening lighting conditions, night lightening, high or low tide differences. - Identification of likely locations of sensitive visual receptors (people) in the vicinity of the proposed site. Receptor types should be identified and located, both from communities or interest and communities of place, both land and water based. Significance will depend on numbers and sensitivity.
Holyhead Mountain Heritage Coast	AONB – Heritage Coast	Undeveloped coastline, designated Heritage Coast.	
North Anglesey Heritage Coast	AONB – Heritage Coast		
Aberffraw Bay Heritage Coast	AONB – Heritage Coast		

7.1.2 Potential impacts

Table 7.2 Potential impacts on designated sites

Potential impact	Phase	Anticipated significance	Comment
Visual impacts to AONB.	All	Potential impact significance unknown	The presence of construction activity will have an impact on the undisturbed natural views of the AONB, particularly from the coastal areas adjacent to the offshore development site, in particular views from the South Stack.
Impacts on designated site ornithological interest features.	All	Potential impact significance unknown	Offshore construction activity and noise have the potential to displace birds from foraging and resting grounds. The installation of surface and subsurface infrastructure has the potential to result in bird collisions, particularly with diving birds such as gannets. The placement of structures on the seabed may reduce food availability in foraging areas. The significance of the impact would be dependent on the Development sites importance as a foraging area, the species present in the Development area and the type/frequency of usage within the site and whether birds present in The Development area are connected to designated site.
Impacts on SAC marine mammal interest features.	All	Potential impact significance unknown.	The presence of construction vessels and activity associated with construction may result in displacement of marine mammals from foraging areas or from migratory routes. The presence of subsea and surface piercing structures may constitute a collision hazard for marine mammals using or passing through the area. The presence of mooring anchors and tethers may also constitute an underwater hazard to

Potential impact	Phase	Anticipated significance	Comment
			marine mammals passing through The Development. Underwater noise generated during operation may displace marine mammals from traditions foraging areas and migratory routes. The likely significance of impact on SAC designated populations will be dependent on the importance of the development are as a foraging or migration route, the proximity of the site to SAC designated breeding colonies.
Impacts on designated marine and coastal sites with benthic ecology interest features.	All	Potential significance of impact unknown.	Benthic ecology features could be influenced by changes in coastal processes, sediment transportation or hydrodynamic regimes. The likelihood and significance of the impact would be dependent on the interest features of the site, proximity to the site and the magnitude of changes, if any, to the physical processes baseline condition.
Impacts to terrestrial ecological designated sites.	All	Potential significance of impact unknown	Impacts to onshore designated sites are expected to be minimal due to the localised nature of impacts arising from the onshore development, although impacts to bird interest features and hydrology dependent features would need to be considered. In addition, coastal terrestrial sites would be considered in terms of coastal processes.

7.1.3 EIA and HRA baseline characterisation strategy

In order to inform EIA baseline and HRA (Habitats Regulations Assessment) reports for designated sites, the following data gaps will be focused on;

- To define the importance of the Development Area, including landfall and onshore area, for ornithological and marine mammals, and to determine connectivity with designated sites. It is likely that this data gap will need to be addressed through a review of existing literature and undertaking of ecological studies.

- To identify the impact of The Development on the Anglesey and Holyhead Mountain AONB. It is likely that this would need to be done through a seascape and landscape visual impact assessment (SLVIA)..
- Identify benthic and coastal sites, including far field if appropriate, that may be influenced by changes in physical processes. This would share data from the physical processes section of the EIA to identify potential changes to processes and a literature review to identify sensitive designated site interest features.
- Identify any potential impacts on connectivity or disturbance to designated site interest features from onshore development.

7.2 Benthic ecology

The following section outlines the benthic subtidal and intertidal ecology of the offshore scoping area and adjacent area. As habitat mapping is based on predicted presence, biotopes within the area adjacent to the offshore scoping area maybe present within the scoping area and have been included in the baseline conditions for completeness.

7.2.1 Baseline conditions

Subtidal ecology

It is generally considered that sediment types of the west coast are typically medium to coarse, consisting of mainly gravel and sand, with a low proportion of mud and clay sediments³³.

Data from the CCW HabMap³⁴ project shows the following predicted biotopes in and around the offshore scoping area (**Table 7.3**). Biotopes are typically characteristic of those found on sandy/gravelly substrate and in mobile, well swept environments. A map of biotopes and their predicted locations are shown in **Error! Reference source not found**.

³³ National Resources Wales (2015) Checklist of Natural Heritage Tidal Stream energy demonstration zone West of Holy Island, Anglesey.

³⁴ CCW Habmap <http://www.ccg.gov.uk/landscape--wildlife/habitats--species/habmap/downloads.aspx>

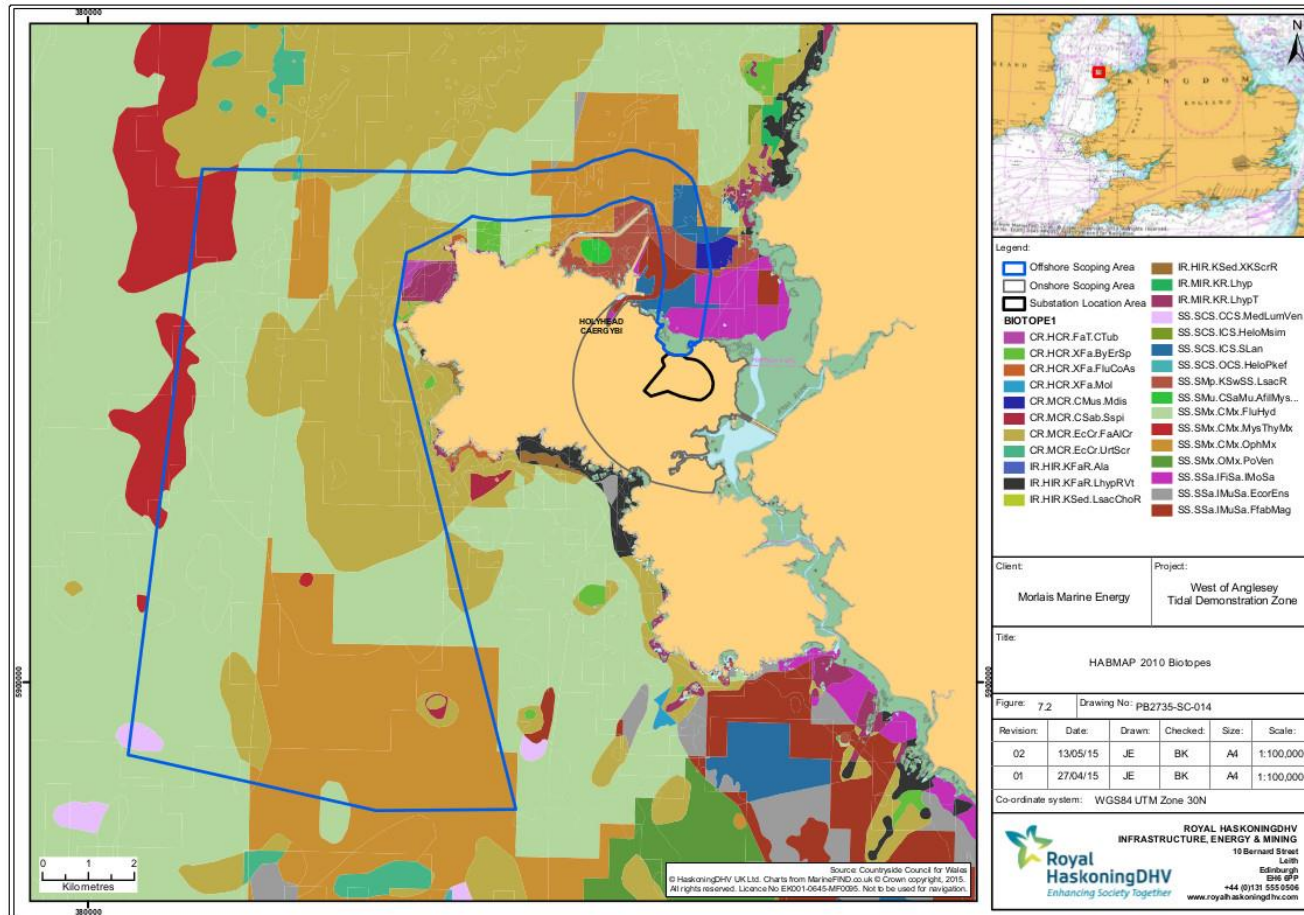


Figure 7.2 Level 5 Biotopes within the offshore scoping area.

Benthic communities typically consist of common polychaete, crustacean, mollusc or echinoderm based. The HabMap data shows that these biotopes are typically common in the Anglesey area and wider Welsh coastal area.

Habitats in the region of the offshore scoping area have been described as having low or medium sensitivity to marine energy developments³⁵. There are no SAC or Annex 1 habitats identified within The Zone, however it is noted that there is the potential for *Sabellaria alveolata* and *Modiolus modiolus* reef to be present.³³

Table 7.3 Predicted Level 3 Biotopes (based on predicted biotope presence³⁴)

Description	Biotope Present	Presence in offshore scoping and adjacent area.
Very tidal swept faunal communities	CR.HCR.FaT	Patchy
Mixed faunal turf communities	CR.HCR.XFa	Patchy
Circolittorial mussel beds	CR.HCR.CMus	Patchy
Circolittorial <i>Sabellaria</i> reefs	CR.HCR.Sab	Patchy
Echinoderm and crustacean community	CR.MCR.EcCR	Widespread
Kelp with cushion fauna and/or foliose red seaweed	IR.HIR.KFaR	Patchy, mainly to north of site.
Kelp and red seaweeds (moderate energy infralittorial rock	IR.MIR.KR	Patchy restricted to coastal area.
Polychaete worm reefs on sublittorial sediment	SS.SBR.PoR	Patchy but widespread.
Sublittorial mussel beds (on sublittorial sediment	SS.SBR.SMus	Patchy but widespread, more common offshore.
Circolittorial Gravel and Coarse Sands	SS.SCS.CCS	Widespread through Development area.
Infralittorial Coarse Sediment	SS.SCS.ICS	Widespread
Kelp and seaweed (on Sublittorial Sediment).	SS.SMp.KSwSS	Widespread
Circolittorial sandy mud	SS.SMu.CSaMu	Uncommon and patchy in Development Area.
Infralittorial sandy mud	SS.SMu.ISaMu	Widespread along Welsh coast but uncommon near Development Area
Circolittorial mixed sediment	SS.SMx.CMx	Widespread
Infralittorial mixed sediment	SS.SMx.IMx	Widespread generally but patchy around Holy Island.
Circolittorial Fine Sand	SS.SSa.CFiSa	Patchy, more widespread to north of Holy Island where cable route would be located.

³⁵ Smith K, Briggs J, Hamer J, Hill A and Walker P (2011). Natural heritage evidence to support strategic planning for marine renewable energy. CCW Policy Research Report No.

11/3. Available to download at <http://www.ccw.gov.uk/landscape--wildlife/managing-land-and-sea/marine-policies/planning--management/marine-renewable-energy.aspx?lang=en>

Description	Biotope Present	Presence in offshore scoping and adjacent area.
Infralittoral fine sand	SS.SSa.IFiSa	widespread to north of Holy Island where cable route would be located.
Infralittoral muddy sand	SS.SSa.IMuSa	Present to the north west of Holy Island.

Intertidal ecology

Anglesey has extensive areas of important, relatively undisturbed intertidal habitat. The Anglesey Coast Saltmarsh SAC contains several intertidal interest estuaries, saltmarsh, Atlantic saltmeadow and *Salicornia*. Although this SAC is not within the scoping area, potential impacts from changes to coastal processes and hydrodynamic regimes will be assessed within the EIA and HRA.

The area of the likely cable route land fall is an expanse of sandy beach bordered by coastal dunes, improved grassland and woodland³⁶. To the east of the landfall and onshore development is the Beddmanarch-Cymran SSSI which is an important area for seagrass, saltmarsh and winter wading birds. To the west of the landfall is an area of soft sea cliffs with some urban development³⁷.

The Rhosneigr Reef SSSI is an intertidal rocky reef situated off of the Rhosneigr beach front. This is a species rich area with substantial rock pool habitats and a good example of zonal transition. The SSSI is approximately 1km to the south east of the scoping area.

In general, the west coast of Anglesey has substantial length of exposed shores which are largely coastal cliff headlands interspersed with beaches of moderately coarse sediment. Although the cable route and landfall will not impact on the west coast of Anglesey, consideration will be given to impacts from changes to coastal processes²³.

7.2.2 Potential impacts

Table 7.4 Potential impacts on marine ecology

Potential impact	Phase	Anticipated significance	Comment
Impacts to benthic communities due to changes in sediment regime	All	Significance of impact unknown	Changes to sediment processes could result in either increased sedimentation through a reduction in tidal energy that may smother benthic communities or increased removal of sedimentation through scour that

³⁶ Capita Symonds (2010) Land at Anglesey Aluminium; Ecological Survey Report.

³⁷ Anglesey Nature (data from CCW) <http://angleseynature.co.uk/webmaps/beddmanarch.html> Accessed 21/04/2015.

Potential impact	Phase	Anticipated significance	Comment
			could change sediment conditions for subtidal or intertidal benthic communities.
Loss of habitat due to infrastructure footprint.	All	Significance of impact unknown	The overall loss of habitat will be dependent on the footprint of the infrastructure being installed and the construction methods used. The significance will also be dependent on which biotopes are present and the relative importance of biotopes that are being lost. The footprint of TEC devices would include swept areas from anchors, tethers and moorings.
Impact to benthic communities due to the creation of sediment plumes during construction	Construction	Effect unlikely to be significant.	Sediment plumes can be created during piling and ground preparation activities. Sediment plumes, when they resettle, have the potential to smother benthic communities. The level of significance would depend on the on the sensitivity of local benthic habitat to smother as well as the nature of sediment dispersal at the installation site.
Disturbance of contaminated sediments	Construction	Effect unlikely to be significant	The disturbance of sediment during construction activities may also release contaminants incorporated in seabed sediments. Released contaminants can become incorporated into benthic communities, in particular filter feeders. The site is likely to be at a low risk of contamination however, this would need to be confirmed.
Introduction of invasive species	All	Potential impact significance unknown	There is the potential for alien species to be introduced into the development area through being transported to site by vessels. In addition, there is the potential for alien species distribution

Potential impact	Phase	Anticipated significance	Comment
			to spread through use of renewable developments as 'stepping stones'. This will be considered further in cumulative impacts.
Impact to benthic communities from EMF or thermal load from export and inter array cables	Operational	Potential significance unknown	Research into the effects of EMF and thermal load has suggested that the impacts from cables are unlikely to have an impact on benthic communities, however, relatively little is known about the potential effects of EMF and thermal load.

7.2.3 EIA baseline characterisation strategy

In order to inform the EIA baseline, the following data gaps will be focused on;

- Confirming the presence of biotopes predicted by the HabMap data³⁴. This would be based on a review of available survey data and potential ground trothing through ecology characterisation surveys.
- The likely nature of impacts to coastal processes, the spatial extent of impacts and the likely impact that this may have on benthic receptors.
- The identification of benthic receptors sensitive to smothering and disturbance.
- The confirmation that there are no Annex 1 habitats within The Development and cable corridor.
- A greater level of detail will be gathered to assess the impact on changes to coastal processes on the intertidal ecology of west Anglesey. This would be done through modelling that would be undertaken as part of the physical processes chapter and potentially intertidal survey of the area.

7.3 Marine mammals, basking sharks and reptiles

7.3.1 Baseline

Mammals

A number of marine mammals have been recorded in the waters around North Wales and Anglesey with the main species being harbour porpoise, bottlenose dolphin, minke, and grey seal³⁸.

Survey data gathered between 1990 and 2007³⁹ shows that harbour porpoise are the most abundant species around Anglesey and are abundant all year round with typically 1-2.5 animal encounters per hour. There is the potential for an area of the Irish Sea adjacent to the WADZ to be designated as a SAC for harbour porpoise, however, this is currently awaiting confirmation.

The bottlenose dolphin population of the Cardigan Bay SAC is known to move around the Welsh coast⁴⁰ and there is a hot spot of bottlenose dolphin activity recorded around the east coast of Anglesey and north coast of Wales up to Conway and Llandudno. Seawatch Foundation⁴⁰ data shows that the offshore scoping area has a low encounter rate of less than 0.1 encounters per hour in comparison to 1-2 encounters per hour in areas of Cardigan Bay. Encounter rates for common dolphin and minke are both less than 0.01 encounters per hour. It is also noted that Risso's Dolphin are occasionally recorded in high numbers around Anglesey³³.

Grey seals are commonly seen around the coast of Anglesey, and although there is no breeding population, Puffin Island off the east coast of Anglesey has a haul out which have recorded up to 100 individuals⁴¹. Pups are born in Autumn in scattered locations, but sea caves and gullies around the North Stacks and Skerries are noted as favourable locations⁴². Grey seals around Anglesey have been associated with the Pen Llŷn a'r Sarnau SAC, Cardigan Bay SAC and Pembrokeshire Marine SAC. Harbour seals are not commonly recorded around the coast of North Wales. **Figure 7.3.1** shows grey seal densities recorded around the offshore scoping area and shows moderate use of the scoping area in comparison with the surrounding areas, **Figure 7.3.2**, shows harbour seal abundance in the area and shows low densities in the offshore scoping area and surrounding Irish Sea⁴³.

³⁸ Baines ME and Evans PGH (2012). Atlas of the marine mammals of Wales. Countryside Council for Wales Marine Monitoring Report No. 68 2nd Edition.

³⁹ Evans, P. & Baines (2009) Mapping marine mammal distributions for conservation management. http://seawatchfoundation.org.uk/wp-content/uploads/2012/08/ECS-peter_poster_2010.pdf

⁴⁰ Pesante G, Evans PGH, Baines ME and McMath AJ (2008b). Abundance and life history parameters of bottlenose dolphin in Cardigan Bay: Monitoring 2005-2007. CCW Marine Monitoring Report No. 61b.

⁴¹ Westcott SM and Stringell TB (2004). Grey seal distribution and abundance in North Wales, 2002-2003. CCW Marine Monitoring Report No.13.

⁴² Westcott SM and Stringell TB (2003). Grey seal pup production for North Wales, 2002-2003. CCW Marine Monitoring Report No.5a.

⁴³ Marine Scotland/Sea Mammal Research Unit 2013

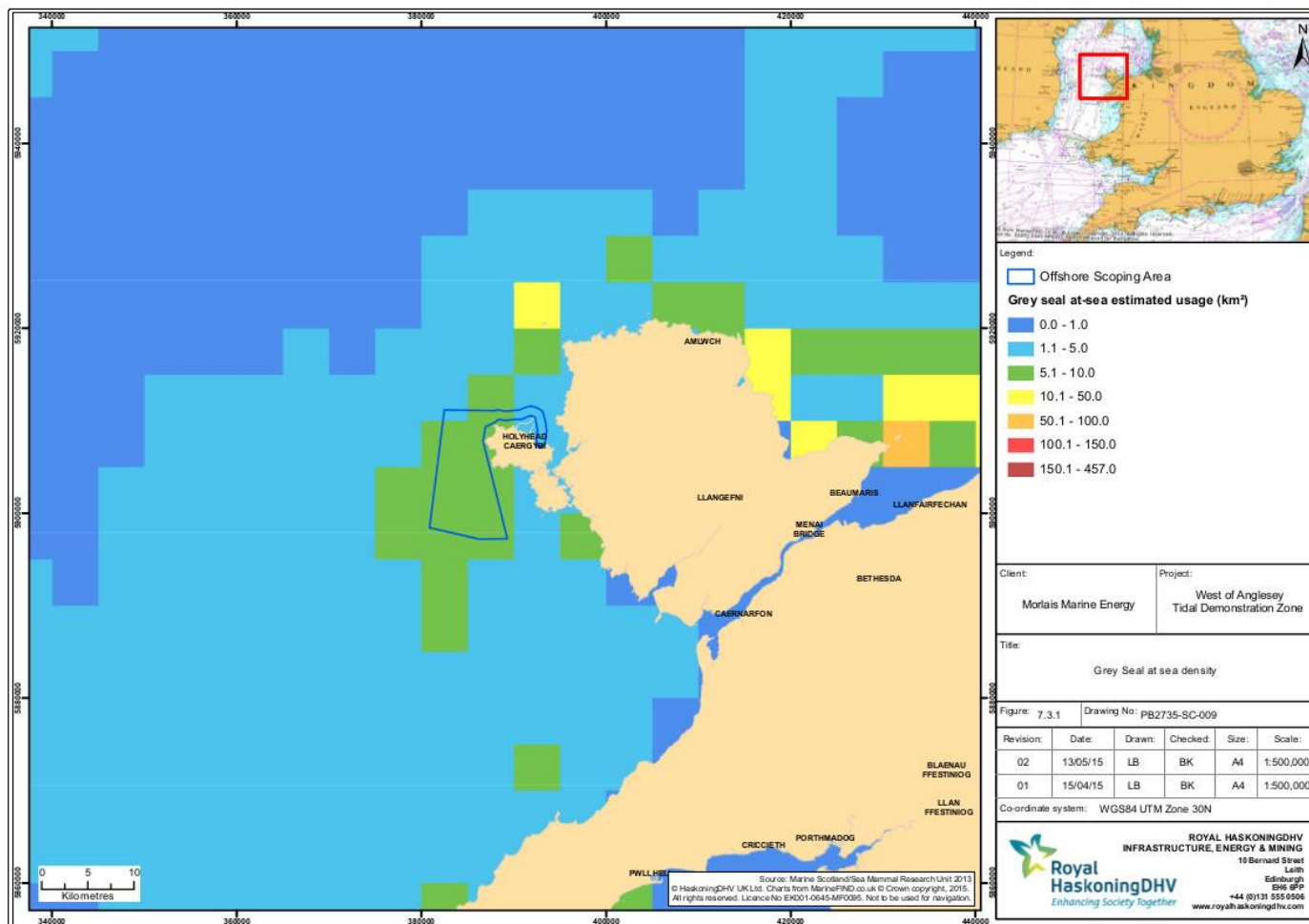


Figure 7.3.1 Grey seal densities in and around the offshore scoping area

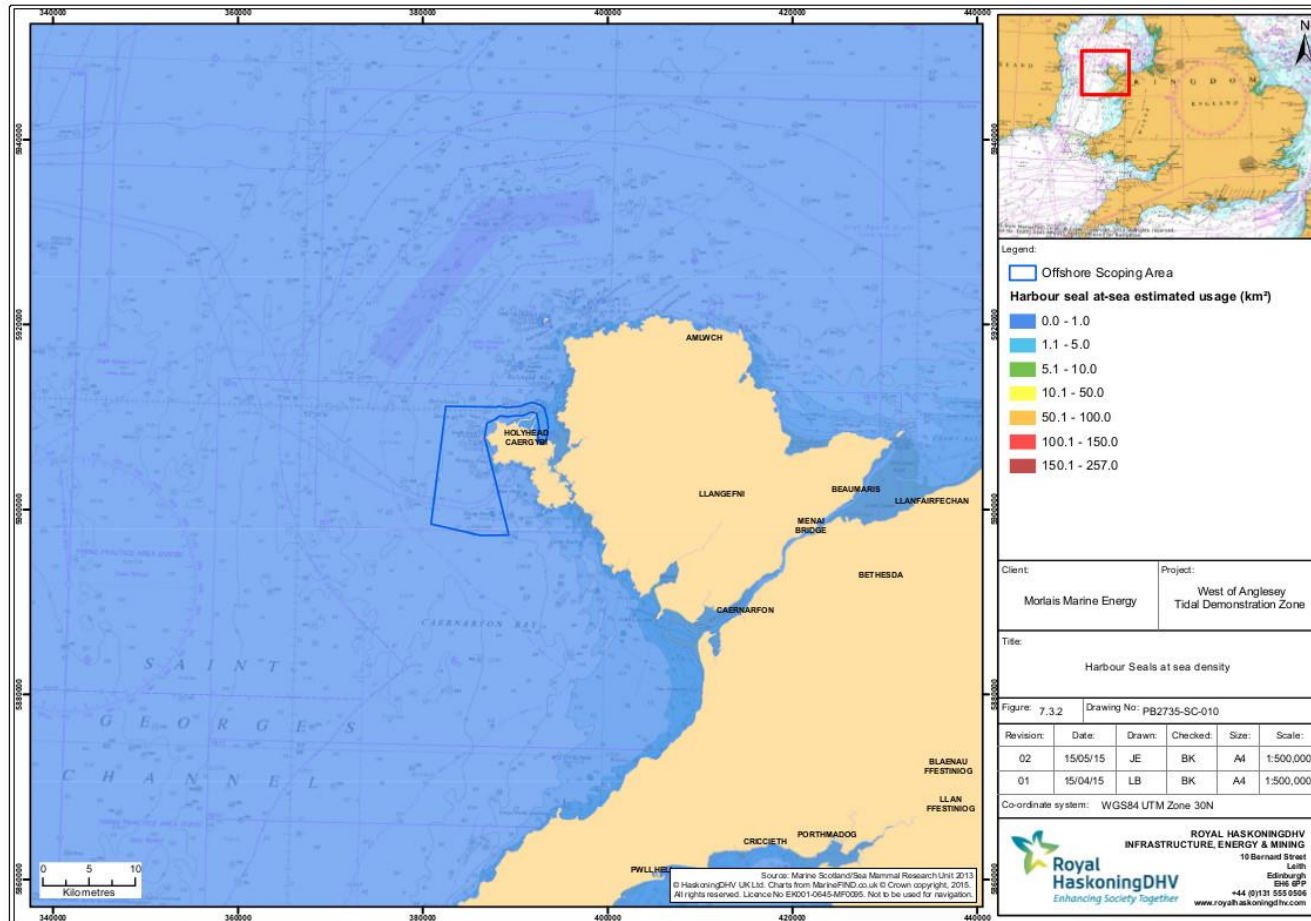


Figure 7.3.2 Harbour sea densities around in and around the offshore scoping area

7.3.2 Basking shark

Basking sharks are not commonly recorded along the coast of Wales, long term sighting data between 1987 and 2006⁴⁴ recorded 7 sightings around Anglesey and the adjacent offshore area. Basking shark sightings follow a similar generally low density pattern throughout the Irish Sea, although the Isle of Man; to the north is a particular hot spot for basking sharks.

7.3.3 Reptiles

Leatherback turtles are occasional visitors to the Irish Sea, tending to be seen during summer months and are often associated with jelly fish blooms. Between 1950 and 2005, there were three recorded sightings around the Anglesey Coast⁴⁵ (INTERREG 2006).

7.3.4 Potential impacts

Table 7.5 Potential impacts on marine mammals, basking sharks and reptiles

Potential impact	Phase	Anticipated significance	Comment
Disturbance and displacement of marine mammals and basking sharks from key habitats by underwater noise.	All	Potential impact significance unknown	Underwater noise levels during marine renewable installation are a key concern for marine mammals and have the potential to result in displacement from key habitats or migratory routes, or in extreme cases physical injury to individuals. Basking sharks are uncommon in the scoping area and unlikely to have areas of importance or set migratory routes through the scoping area. Operational noise of devices could also have the potential to displace mammals from the immediate vicinity, although these noise levels would be much lower than those during the construction phase.
Marine mammal collision with marine	Operational	Potential impact significance	By their nature, marine mammals tend to be wide ranging. There is a

⁴⁴ Bloomfield, A & Solandt, J-L, (2006). The Marine Conservation Society Basking Shark Watch, 20 year report (1987-2006). Marine Conservation Society.

⁴⁵ INTERREG (2006) Irish Sea Leatherback Turtle Project- Populations, Origins and Behaviour. INTERREG IIIA Initiative 2003-2006

Potential impact	Phase	Anticipated significance	Comment
infrastructure.		unknown.	potential for devices mounted or tethered to the seabed to act as an obstruction to marine mammals passing through the Project. The potential risk of collision will be dependent on importance of the site and frequency of use of the site, either as a migratory route or foraging zone.
Marine reptile and basking shark collision with marine infrastructure.	Operational	Effect unlikely to be significant.	Turtles and basking sharks are uncommon in the scoping area and are likely to be passing through when recorded. Due to the uncommon nature of these species in the offshore scoping area, the risk of collision is expected to be low.
Collision with vessels.	All	Potential significance unknown.	With an increased amount of vessel activity within the WADZ there is an increased risk of collision between marine megafauna and vessels. Marine mammals, due to their relative abundance, are at greater risk than basking sharks and turtles which are both uncommon within the scoping area. Vessel movement will be at its most intense during construction with fewer vessels operating during operation. The significance of the impact will be dependent on the level of usage of the WADZ by marine mammals and the numbers of vessels active during construction.
Contamination from accidental fluid release.	All	Effect unlikely to be significant .	Through the following of industry best practice guidelines it is considered that accidental contamination will not be a significant impact.

7.3.5 EIA baseline characterisation strategy

In order to inform the EIA baseline, data gathering will focus on filling the following data gaps;

- Species presence to identify which species are present in the offshore scoping area. This would be done through a review of existing literature and local sightings records, eg. Seawatch Foundation.
- Spatial and temporal abundance and distribution of marine mammals within the offshore scoping area to determine the relative importance of the site to marine mammals. This would be done through a review of existing literature and studies. There may also be the potential to undertake baseline surveys if appropriate.
- A thorough literature review of turtles and basking shark recordings to determine frequency and distribution of sightings within the scoping area.
- Determine underwater noise baseline conditions, this would be done by a specialist underwater noise specialist who would produce a technical report of baseline conditions.
- Determination of collision risk. This would be addressed through a literature review of similar studies and results from studies such as SeaGen.

7.4 Fish and shellfish populations

This section discusses the fish, shellfish and migratory fish populations found within the offshore scoping area. There is a limited amount of site specific information available, so literature from the wider Anglesey area has been used to infer likely populations within the scoping area.

7.4.1 Baseline

Marine fish

The offshore scoping area is likely to mainly consist of high energy sandy, gravelly habitats with areas of rocky habitat towards coastal areas. Nearby sites (Skerries) report that blennies, gobies, bullheads and rockling are present around Anglesey coastal waters and larger species such as conger eel, topknot, ling, wrasse, polllock, gurnard and John Dory are also likely to be present⁴⁶.

Flat fish are also commonly recorded in the wider Liverpool Bay/North Wales coastal area, the most common species are typically plaice and dab, however, species such as turbot and thornback rays are also recorded along with dogfish, tope and greater spotted dogfish⁴⁷.

⁴⁶ PMSS (2011). Skerries Tidal Stream Array EIA. RWE.

⁴⁷ Starida Recreational Angling www.starida.co.uk/index.php/fishing

In terms of pelagic species, herring, sprat, mackerel, scad and sandeels are widely distributed throughout the Irish Sea, including within the offshore scoping area. although sand eels are likely to be restricted in their distribution to sandy areas⁴⁸.

Figure 7.4.1 and **Figure 7.4.2** show nursery grounds for sole, plaice, cod, tope, thornback/spotted ray, sandeel, mackerel and whiting. The figures indicate that the offshore scoping area are not important spawning areas and have low intensity use by for tope, thornback/spotted ray and whiting. **Figure 7.4.1** and **Figure 7.5.2** shows spawning grounds for sandeel, plaice, whiting, lemon/dover sole, cod, mackerel, ling and hake. The figures indicate that the offshore scoping area is not a specific spawning area and has low intensity use by all species but ling and hake^{49, 50}.

⁴⁸ Pawson, M & Robson, C in Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., & Davidson, N.C., eds. 1996. *Coasts and seas of the United Kingdom. Region 13 Northern Irish Sea: Colwyn Bay to Stranraer, including the Isle of Man*. Peterborough, Joint Nature Conservation Committee.

⁴⁹ Coull, K.A., Johnston, R., and Rogers, S.I. 1998. *Fisheries Sensitivity Maps in British Waters*. Published and distributed by UKOOA Ltd., v + 58 pp.

⁵⁰ Ellis, J. R., Milligan, S., Readdy, L., South, A., Taylor, N. and Brown, M. 2010.

Mapping spawning and nursery areas of species to be considered in Marine Protected Areas (Marine Conservation Zones). Cefas, Lowestoft.

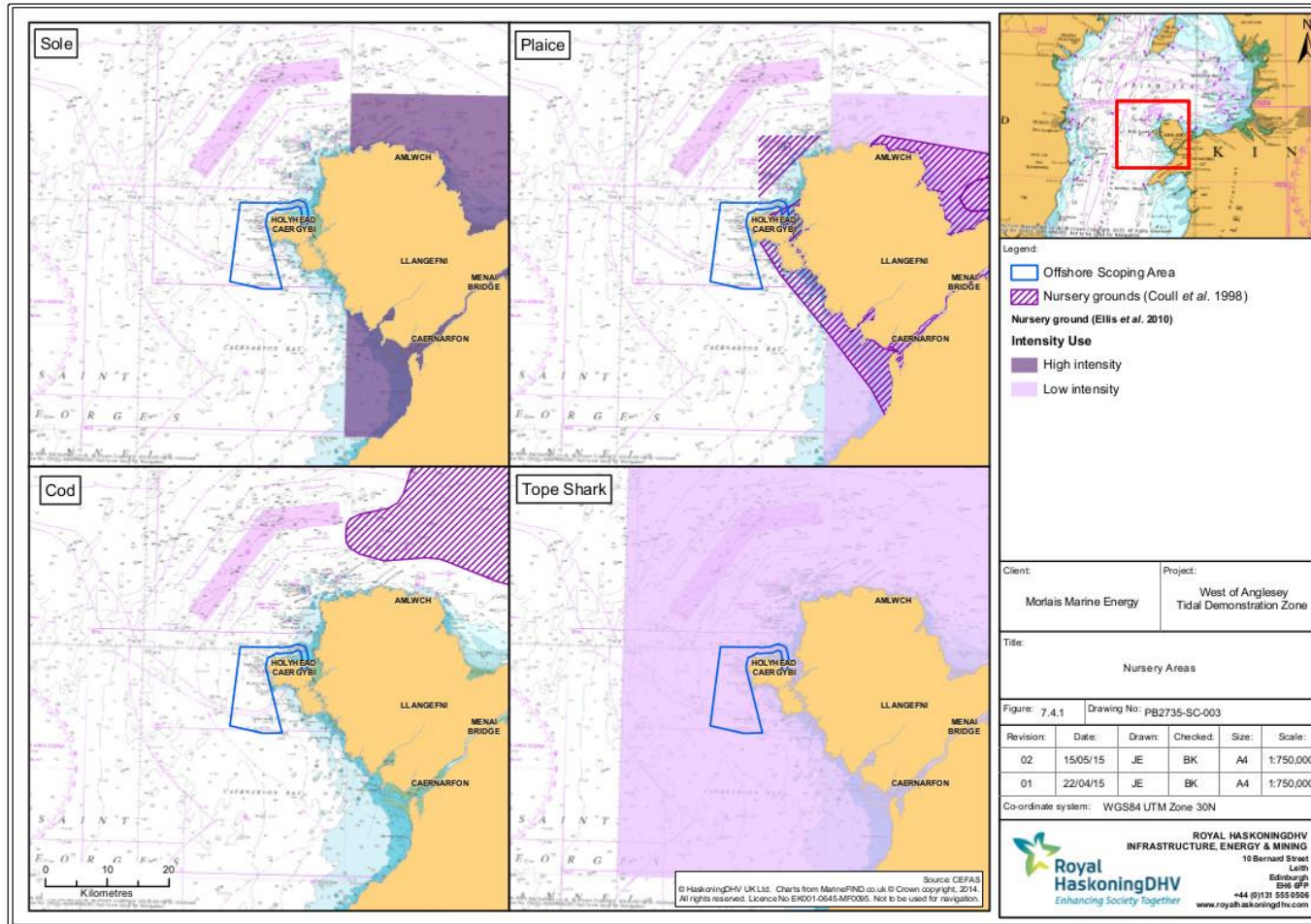


Figure 7.4.1 Map of fish nursery areas, sole; plaice; cod and tope.

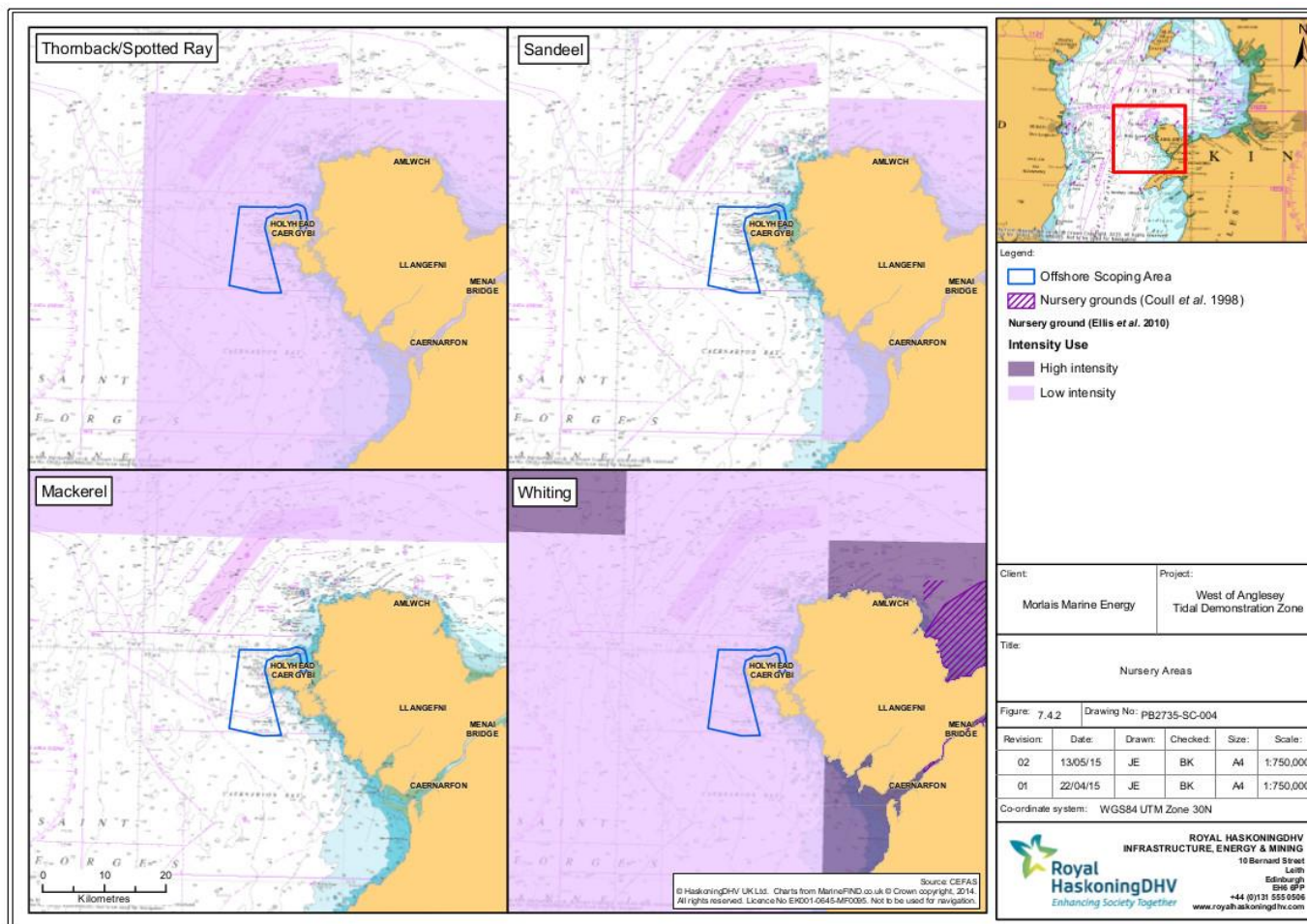


Figure 7.3.2 Map of fish nursery grounds; thornback/spotted ray, sandeel, mackerel and whiting.

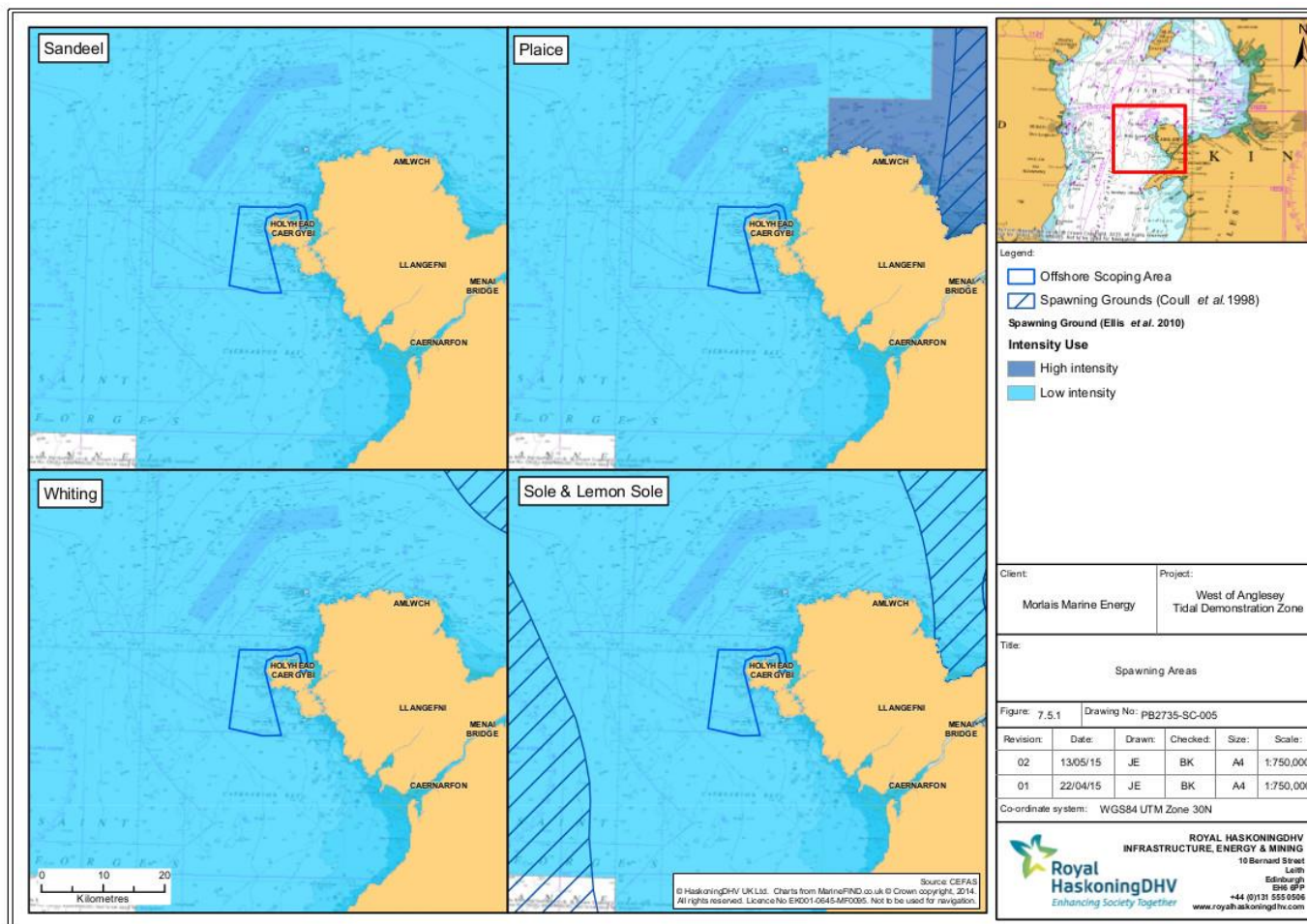


Figure 7.4.1 Map of fish spawning areas; sandeel; plaice; whiting and sole/lemon sole.

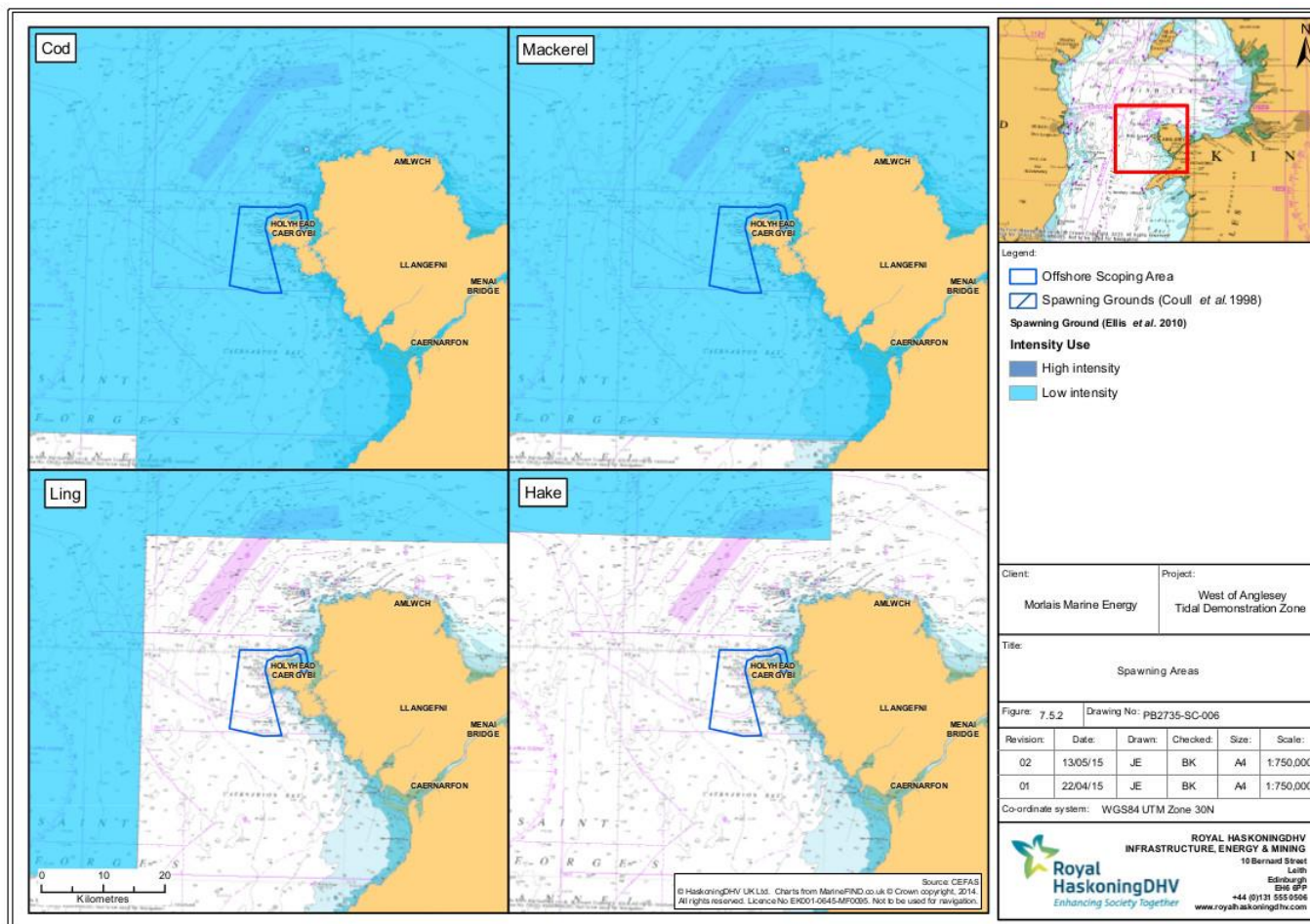


Figure 7.5.2 Map of fish spawning area for; cod; mackerel, ling and hake

Shellfish

Fishing records from Holyhead show that shell fish are the only commercial species landed at the harbour. None of the registered vessels are licenced for scallop fishing, however, queen scallops suggesting they are not common within the scoping area are known to be a common in the wider Irish Sea area. Within the scoping area and adjacent area, the most likely shell fish species are likely to be brown crab, spider crab, lobster and mussels (holyislandseafood.co.uk). Within the wider Anglesey area scallops, oyster, langoustines, brown shrimp, cockles, winkles and clams are also fished locally and supplied to local businesses⁵¹

Migratory fish

The offshore scoping area has the potential to be within a transitory route for several migratory species including bass, salmon and sea trout³³.

Shad and lamprey are interest features in several relevant SACs (see **section 7.1**).

The following designated sites contain migratory fish which have the potential to transit through the offshore scoping area;

Designated Site	Interest feature
River Dee and Bala Lake SAC	River lamprey, sea lamprey and Atlantic Salmon
Dee Estuary	River lamprey, sea lamprey
Afon Eden Cors Goch Trawsfynydd SAC	Atlantic Salmon
Afon Gwyrfai a Llan Cwellyn SAC	Atlantic Salmon
Cardigan Bay SAC	River lamprey, sea lamprey.

The west coast of Holy Island is often fished for bass by local fishermen, with Rhosneigr and the surrounding areas being often reported as a popular fishing location for bass⁵². Sea Trout fishing is also reported in the coastal waters around Anglesey⁵³

Once migratory fish leave their freshwater river and enter open water it is difficult to ascertain their migratory routes out to sea. There is little information available to determine likely migratory routes or abundance for migratory species that may be transiting through the scoping area.

⁵¹ MJ White Fishmongers, www.mjwhitefishmongers.co.uk Accessed 24/04/2015

⁵² Rhosneigr tourist information; www.rhosneigr.org.uk/Activities/SeaFishing.html accessed 22/04/2015.

⁵³ Celtic Sea Trout Project (2011) <http://celticseatrout.com/project-updates/willow/> accessed 23/04/2015

7.4.2 Potential impacts

Table 7.6 Potential impacts on natural fish and shellfish

Potential impact	Phase	Anticipated significance	Comment
Disturbance to demersal fish	Construction	Potential impact significance unknown.	Construction activities that disturb seabed habitats have the potential to disturb demersal fish. The significance of the impact would be dependent on construction methods and project design.
Loss of shell fish habitat	All	Potential impact significance unknown.	Loss of habitat through placement of devices and swept area of mooring cables has the potential to remove habitat for shellfish. The significance of this would be dependent on the final project design and the importance of the area for shellfish.
Impacts on fish and shell fish through a decrease in water quality.	Construction	Potential impact significance unknown.	Construction methods that create sediment plumes also have the potential to release contaminants (if present) into the water column. This could result in decreased water quality that could impact on the health of fish and shell fish populations and potentially impact on the quality of commercial species. The significance of the impact will depend on the construction methodology, the presence of contaminants and the abundance of species in the offshore scoping area..
EMF as a barrier to migratory fish	Operational	Potential impact significance unknown.	Research into the impacts of EMF as a barrier effect is still not conclusive about the impacts, although work is currently ongoing to look at the impacts on migratory salmon in Scotland . EMF emissions from electrical infrastructure could cause a barrier effect for fish migrating through

Potential impact	Phase	Anticipated significance	Comment
			the scoping area to and from open water.
Impacts on migratory fish from underwater noise	All	Potential impact significance unknown	Underwater noise from construction has the potential to displace migratory fish from their migration routes if this passes through the offshore scoping area during construction. During the operational period, noise levels are expected to be significantly lower than those during construction. The sensitivity of migratory fish to underwater noise is not well documented and migratory pathways of migratory fish are not well understood once individuals leave the river.
Migratory fish collision risk with devices	Operational	Effect unlikely to be significant	Although migratory pathways are not well understood it would be expected that there would be a low density of fish transiting through the offshore scoping area.
Resource availability through loss of habitat	All	Potential significance of impact unknown.	The loss or alteration of habitats within the development have the potential to impact on resource availability and prey distribution within the offshore scoping area. The significance of the impact will be influenced by the extent of any change to benthic habitats and the importance of those areas as a resource.

7.4.3 EIA baseline characterisation strategy

The EIA baseline will be informed through focusing on the following data gaps;

- Understanding natural fish population species presence and distribution within the offshore scoping area. This would be done through a review of existing literature, existing environmental data such as bathymetric data and site specific survey.

- Understanding likely usage and density of migratory fish within the scoping area. This would be done through literature review of available information and consultation with local recreational anglers.

7.5 Ornithology

This section outlines ornithological interests within the offshore and onshore scoping areas. Due to the wide ranging nature of ornithology interests, a wider search area has been included to include birds that forage considerable distances.

The list of SPAs with interest features that will be considered are provided in **Section 7.1 Natural Heritage Designated Sites**.

7.5.1 Baseline

Onshore Ornithology

Breeding bird surveys undertaken at the Penrhos Coastal Park suggested that there were 27 breeding bird species within the coastal park³⁶; these were;

Table 7.7 Breeding birds present in Penrhos Coastal Park³⁶)

Blackbird	Great tit	Mistle thrush	Wood pigeon
Blackcap	Greater spotted woodpecker	Moorhen	Wren
Carrion crow	Willow warbler	Mute swan	
Chaffinch	Grey heron	Robin	
Chiffchaff	Greylag goose	Sedge warbler	
Curlew	Jackdaw	Song thrush	
Dunnock	Magpie	Whitethroat	
Goldfinch	Mallard	Willow warbler	

In addition to these species, several other species of breeding birds of note were recorded in nearby sites at Cae Glas and Holyhead Leisure Centre, these were; mallard, dunnock, shovler, oystercatcher, song thrush, sedge warbler, linnets, tufted duck and reed warbler. All these species are either red or amber list species³⁶.

The Penrhos Coastal Park provides a 200 acre area of open land and woodland and is inshore of the potential landfall location. It provides a suitable habitat for breeding birds and has the largest area of woodland on Holy Island. Outside of the coastal park, the substation location area is either urban or open land, in the wider onshore scoping area there is a wide range of habitats, including heathland, coastal heathland, heather and pastoral. Currently, there is little information available to determine bird species present in the inland rural areas, although this is likely to be typical of birds associated with farmland.

To the south of the A55 is an important area of breeding bird habitat which forms a rare gradient habitat from woodland to intertidal mud. This area provides important habitat for breeding farmland, coastal and migratory birds³⁶.

Coastal and offshore ornithology

The Irish Sea around Anglesey is used by a wide number of seabird species, including coastal and offshore birds. As the scoping area is 1km from shore, there is the potential for both offshore species and coastal species to be present in the scoping area. The nearby Island Coast SPA and Ynys Fferig, Cemlyn and the Skerries SPA are breeding areas for sandwich, roseate, arctic and common terns, with puffin, shag and red breasted merganser being interest features off SSSIs associated with the SPAs. The scoping area is within foraging distances of these species and there for there is the potential for individuals from these site to be present in the scoping area³³.

Immediately adjacent to scoping area is the South Stack RSPB reserve which have gannet and razorbill listed as interest features. Anglesey itself is not noted to be of importance to wintering seabirds, however, Liverpool Bay and Caenerfon Bay are important areas for wintering seaduck and diving species⁴⁶.

There are several SPAs (Liverpool Bay, Dee Estuary, Traeth Lafan, Puffin Island, Dyfi and Grassholm) around Liverpool Bay which are important areas for Mank shearwaters, puffins and lesser black-baked gull. The scoping area is within foraging distance of these sites and potentially of use as a foraging area. In addition, Manx shearwaters from the Aberdaron Coast and Bardsey Island SPA may be present within the offshore scoping area. Birds from SPAs further afield, such as the Scomer and Skokholm SPA where sea bird assemblage is an interest feature.

Fulmar, cormorant, black headed gull, herring gull, great black backed gull, kittiwake and guillemot are all Amber List species, with the exception of herring gull which is a re list and UK Bap species are have breeding colonies within foraging distance of the offshore scoping area. In particular, the cliffs of the South Stack provide nesting sites for large numbers of puffin, razorbills and guillemots (as well as choughs and peregrine falcons)⁴⁶

The Beddmanarch-Cymyran SSSI is an important area for wintering water bird species, namely ringed plover, greenshank, red-breasted merganser and goldeneye³⁷.

The importance of the scoping area as a foraging area is not currently known, however, it is anticipated that important prey species such as sand eel, herring and sprat have the potential to be present within the scoping area.

7.5.2 Potential impacts

Table 7.8 Potential impacts on ornithology

Potential impact	Phase	Anticipated significance	Comment
Collision risk from turbine and subsea infrastructure.	Operational	Potential impact significance unknown.	Further information is required to ascertain the risk of collision with turbines and subsea infrastructure. The risk is only expected to be associated with diving seabirds. The

Potential impact	Phase	Anticipated significance	Comment
			significance of impact is dependent on how birds behave around sub-sea structures and the importance of the offshore scoping area as a foraging ground.
Displacement from vicinity of turbine.	Construction and Operation	Potential impact significance unknown.	During construction there is a potential for noisy construction activities such as piling to displace birds from the vicinity of activity. There is a lack of understanding on whether operational devices cause displacement. In general, displacement during either the construction or operational phase is expected to be minor and localised.
Disturbance by vessel activity.	Construction and Operation	Potential impact significance unknown.	Vessel activity may result in localised displacement. Vessel activity during construction is expected to be more intense than the operational phase. Initial prediction of species within the scoping would suggest that these species are relatively tolerant of vessel activity and any displacement would be likely to be temporary and localised. The significance of the effect will depend on the importance of the offshore scoping area as a foraging ground and the sensitivity of the species which frequently use the site.
Lighting of offshore vessels, TECs and other infrastructure.	All	Potential impact significance unknown.	Lighting of offshore vessels during construction and the operational lighting of TECs and other infrastructure may impact on baseline distribution of the birds. As the coastal area is currently undeveloped and birds in the offshore scoping area maybe sensitive to changes in the level of lighting. Further information

Potential impact	Phase	Anticipated significance	Comment
			regarding navigational lighting requirements and sensitivity of species present to lighting is required.
Marine seabed habitat loss/change due to installation of infrastructure.	All	Potential impact significance unknown.	The footprint of the TECs, substations and cables will remove some available habitat, however the sensitivity of the impact will depend on the proportion of available habitat replaced and the importance of the offshore scoping area as a foraging ground. Given the current level of knowledge of available habitat, it is unlikely that the presence of devices will remove a significant proportion of key foraging habitat.
Onshore habitat loss.	All	Potential significance of impact unknown.	The area for the onshore cable route and substation is likely to be largely developed although areas around the landfall, in particular the Penrhos Coastal Park, may represent moderately important habitat for breeding and foraging birds. Habitat loss due to the cable route installation would be expected to be minimal and largely temporary. The significance of the impact will depend on the final cable route and substation location and the importance of the onshore construction areas in terms of bird nesting and foraging.
Disturbance due to onshore construction works.	Construction	Potential significance unknown.	Noise and presence during onshore construction works has the potential to ca. As the majority of the onshore area is expected to be developed, disturbance to birds is anticipated to be minor although there is the potential for disturbance to birds in open land around the landfall.

7.5.3 EIA baseline characterisation strategy

In order to inform the baseline of the EIA the following data gaps will be focused on;

- Determining the seasonal distribution and abundance of species within the Development area. It is likely that this would be done through a combination of;
 - o A review of existing relevant bird data such as JNCC Seabird Colony Counts /BTO WeBS data.
 - o Coastal and terrestrial surveys;
 - o Boat based /aerial surveys.
- Gaining a greater understanding of species behaviours within the Development area and potential connectivity to designate sites. It is likely that this would be done through a review of existing information and boat based/coastal surveys designed to look at behaviour such as flight direction and foraging behaviour during breeding season.

7.6 Terrestrial and coastal ecology

This section focuses on the terrestrial ecology environment within the onshore scoping area. Ornithology receptors are discussed separately in Section 7.5, while geology, hydrology and soils are considered in Section 6.3 and then all designated habitats that will be considered during the EIA are detailed in Section 7.1.

7.6.1 Baseline

Terrestrial ecology

The land within the scoping area is a mix of;

- Urban development (eg Holyhead);
- Open/wild land (eg. Penrhos Coastal Park);
- Low lying coastal area (eg. Penrhos and Trearddur);
- Coastal cliff;
- Pastoral agricultural land.

Designated habitats such as the Holy Island Coast SAC and Holy Island Coast and Rhoscolyn Coast SSSI have been considered in Section 7. It is assumed that, given the nature of the development and location the nature of any disturbance or habitat loss would be localised, a full review of impacts on terrestrial designated habitats suggested by NRW will be undertaken for the EIA and HRA, however, for this scoping survey, only designated sites on Holy Island have been considered in terms of terrestrial ecology.

The onshore works are expected to begin at the landfall at Penrhos beach which is a wide expanse of sandy beach. Behind this is the Penrhos Coastal Park with is an improved grassland and woodland areas, with some dune, marshy grassland and poor fen habitat. There are at least three UKBap habitats (pre-2012) previously recorded within the substation location area, largely within the Penrhos .

The woodland area presents the only sizable area of mixed woodland on Anglesey and provide important habitat for nesting birds, badgers, bats and red squirrel. Evidence of water vole have also been recorded in drainage ditches in the area.

Coastal cliffs within the Penrhos Coastal Park contain important lichen communities with coastal habitats in and around Penrhos beach also provide important habitat for migrant birds and reptiles³⁶.

In the south of the substation location area, immediately to the south of the A55, is an area known as Cae Glas, This area contains eight UKBAP (pre-2012) priority habitats including a rare undisturbed habitat gradient from woodland to intertidal mud. Brown hare and badger are found in this area and the woodland has been used as a site for the reintroduction of red squirrel⁴⁶

To the east of the Anglesey Aluminium works the land provides some areas of open land and the urban fringe of Holyhead. This area appears to be poor quality grass land with some small shrub and broken woodland⁵⁴.

Coastal ecology

In the wider scoping area are important coastal cliff and associated grass land and heath such as those of the Holy Island Coast SSSI. As all onshore construction activity will be undertaken in the area in and around Holyhead and Penrhos, it is not anticipated that there would be any impacts on coastal cliff along the west coast of Holy Island, however, this will be looked at in greater detail during the EIA and once the final location of the cable route and substation is known.

The impact on coastal SACs and SSSIs in terms of changes to sediment processes and receptor food resource would be assessed in the EIA and specific impacts on SAC and SSSI interest features would be addressed separately.

The central areas of Holy Island, to the south and west are largely rural pastoral land and coastal grassland, with upland areas of heath around Holyhead Mountain. These areas would be expected to be of low-moderate importance to terrestrial ecology receptors (excluding ornithology). The cable route will reach landfall at Penrhos Beach and the substation will be located in the area adjacent to the Anglesey Aluminium works, based on current knowledge, it is not considered that there is likely to be a significant impact from onshore works away from the localised vicinity of the construction area, although this will be verified during the EIA.

⁵⁴ Google Satellite Imagry Data www.google.com/maps Accessed 19/04/2015

7.6.2 Potential impacts

Table 7.9 Potential impacts on terrestrial ecology

Potential impact	Phase	Anticipated significance	Comment
Physical disturbance to terrestrial and coastal habitats during the cable installation	Construction	Potential significance of impact unknown	The land fall area is expected to be an expanse of sandy beach which would not be an important habitat for terrestrial receptors; however, there is the potential for ecological significant habitats to be within the onshore construction area . The significance of the impact would depend on the final cable route. Beyond the land fall area onshore construction works are expected to be in largely previously developed or degraded land that is of little ecological importance although, connectivity with other sites would need to be considered.
Physical disturbance to terrestrial habitats during the construction of the substation	Construction	Potential significance of impact unknown	It is anticipated that the significance will be low as the substation is likely to be constructed in an area of low importance to ecological receptors.
Habitat loss	All	Potential significance of impact unknown	The significance would depend on the final location of the substation and cable route and the overall footprint of the onshore development.

7.6.3 EIA characterisation baseline strategy

In order to inform the EIA baseline the following data gaps would be focused on;

- A greater level detail on terrestrial and coastal habitats would need to be gathered through a combination site specific survey and review of available data.
- Information on the presence of UK and local priority species and EPS species would be needed. This would be likely to require a combination of literature review and bat, badger, red squirrel, water vole and phase one habitat surveys.
- Several priority aquatic species are likely to be present within the scoping area. Freshwater habitat and survey may be required to identify ecological receptors in need of consideration..

8 HUMAN ENVIRONMENT

8.1 Seascape and landscape

8.1.1 Baseline

The west coast of Anglesey has views of and uninterrupted view of open sea, with a scenic coastal area consisting of hard rocky cliffs and headlands interspersed with bays and insets with headlands providing views to undeveloped areas of sea. The Holy Island coast is included within the Anglesey AONB.

A seascape assessment undertaken for the Isle of Anglesey Council in 2013 identified 36 Seascape Character Areas (SCA), of which eight of which are relevant to onshore and offshore scoping areas⁵⁵, these are detailed in **Table 8.1** and their location is shown in **Plate 8.1**.

Table 8.1 SCAs identified as part of Anglesey Seascape Assessment⁵⁵

SCA	Description
Carmel Head to Penrhyn (SCA 10)	Carmel Head has spectacular coastal scenery with islets, cliffs, caves, beaches and wave-cut platforms. There are several prominent formations in the Skerries, White Ladies, Coal Rocks and West Mouse. In the region of Holy Island there is rolling topography. Within the SCA there is a variety of habitats including rocky shores, coastal heath, forestry and farming inland. Holyhead Port influences views particularly in the southern area of the SCA and ships within the approach can be seen from the coast.
Holyhead (SCA 11)	This area is characterised by a high level of development (Holyhead) and the influence of Holyhead Port. Views are dominated by long breakwaters, commercial shipping, cranes and smaller vessels. The landscape is settled and busy and at nights it is a well-lit environment. Holyhead mountain rises above the town providing a rocky profile with heather cover which contrasts with the build environment of the town and port.
Inland Sea (SCA 12)	The Inland Sea is a unique visual environment, created by the impounding of a tidal channel. The Stanley embankment across the channel accommodates the A55 dual carriageway and railway line. The Inland Sea has a rare variety of intertidal habitats and is a popular location for water sports. The character changes at Four Mile Bridge with the northern part of the sea remaining flooded at low tide and having a very shallow tidal range. The southern part drains at low tide into a few meandering channels, extensive sand banks, rock islets and sheltered muddy creeks. The surrounding landscape is low-lying and has a sense of seclusion.
Holyhead Mountain (SCA 13)	Holyhead mountain forms a high profile over Holy Island and is a prominent and distinctive landmark from both land and sea. The cliffs associated with the coastal area of the SCA are high and

⁵⁵ IoACC (2013) Seascape Character Assessment.

SCA	Description
	<p>rugged and create a dramatic coastline. The lighthouse at South Stack is a prominent maritime feature that is still in use. The mountain itself is the largest expanse of coastal heath on Anglesey and consists of heather, bracken, gorse and grassland as well as the unique <i>spatulate fleawort</i>. The SCA supports a variety of seabirds and has a tranquil and remote feel despite the close proximity to Holyhead. It is also a site that is popular with visitors due to the panoramic view of the area.</p>
Rhoscolyn (SCA 14)	<p>This is a relatively flat, low lying area with horizontal horizons and uninterrupted views out to sea. The SCA is a mix of Rhôs (rush) pasture, coastal heath and exposed rock. The coast is deeply crenelated and consists of low rocky cliffs and small bays. It is an exposed coastline with active coastal waves. Holyhead mountain provides a prominent back drop to the north west. There are small settlements following the coast along the B4545, however, away from this road settlements are scattered and mainly individual farms giving the SCA an undeveloped feel.</p>
North West of Anglesey (offshore (SCA 30))	<p>This is a deep water environment with an undulating rocky sea floor and high energy due to tidal currents flowing parallel to the coast. The Holyhead to Dublin ferry passes through the southern part of the SCA. There are many wrecks within the SCA and low levels of fishing which is predominantly longlining or whelk potting. The lights and breakwaters of Holyhead Harbour are visible to the south-east. Holyhead mountain is also a prominent landmark.</p>
West of Anglesey (offshore (SCA31))	<p>In the eastern part of the SCA the seabed is a rocky, moderate energy environment. Further offshore the seabed deepens and becomes dominated by sediment with patches of rock. The coastline onland of this SCA (SCA14) is treacherous and contains many offshore rocks and wrecks. The South Stack is located just to east of the SCA boundary in SCA 13.</p>
Caernarvon Bay (Offshore (SCA 32))	<p>The seabed is dominated by shallow sand, deepening further offshore. There are also pockets of coarse sediment and rocky seabed. The SCA is exposed to westerly waves, although sheltered to the south from the Llyn Peninsula. The area of the sea is used for trawling, scallop dredging and potting. The bay is relatively enclosed and bordered by land on three sides. The SCN contains numerous wrecks including a military 1918 submarine and the Caernarvon Bay lightship.</p>

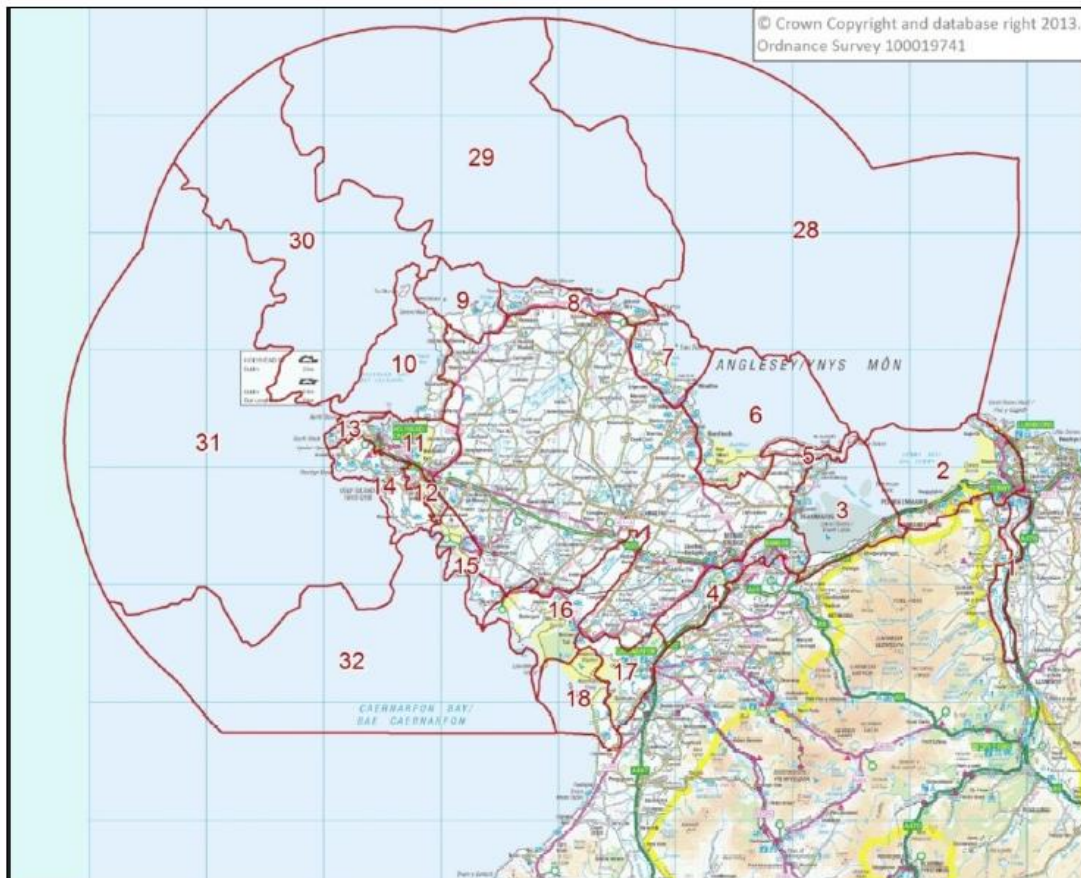


Plate 8.1 Seascope Character Areas⁵⁵

The offshore development would largely be within SCA 31 and border SCA 14. Construction activity and surface piercing infrastructure would be visible from receptors in areas of offshore SCAs 30, 31 and 32. Offshore construction and operational activities would also be visible from onshore SCAs 13 and 14. The offshore cable route would pass along the boundary of SCN13, 31 and 10 and would approach the landfall through SCA 11. There would be little visible indication of the cable route during operation, particularly from distance, however, construction activities would be visible from offshore SCAs 30 and 31 and onshore SCAs 10, 11 and 13.

The onshore substation, depending on the location, would likely to be within SCA 11 and would potentially be visible from SCAs 10, 12, 13 and 14, however, given the nature of the Holyhead SCA, it is unlikely to considerable change the nature of SCA 11 itself.

Within the scoping area and adjacent area there are several heritage coasts, the Holyhead Mountain Heritage Coast, the North Anglesey Heritage Coast and the Aberffraw Bay Heritage Coast. The offshore Project would be likely to be visible from the Holyhead Mountain Heritage Coast but is unlikely to be viewable from the other two heritage coasts. Construction activity within the cable route and increased vessel activity within the harbour are likely to be visible from the North Anglesey and Holyhead Mountain Heritage Coasts.

8.1.2 Potential impacts

Table 8.2 Potential impacts on seascape/landscape

Potential impact	Phase	Anticipated significance	Comment
Changes to seascape character from offshore infrastructure.	Construction and operation	Potential significance of impact unknown.	The introduction of permanent manmade structures to the offshore environment may result in significant changes from baseline conditions, however, the significance will be dependent by the final project design, in particular, the nature and amount of surface piercing devices and increased vessels activity.
Changes to the landscape/seascape through the presence of onshore infrastructure.	Construction and operation	Potential significance of impact unknown.	The location of the substation is likely to be in an area of existing development within the Holyhead SCA and is therefore unlikely to have a significant impact on the nature or the SCA. However, the significance will be dependent on the final location and design of the substation.
Changes to visual amenity,	All	Potential significance of impact unknown,	The construction and introduction of manmade structures into previously undeveloped areas of sea has the potential to impact on the amenity of the offshore area. The significance of the impact will be dependent on the final project design.
Cumulative impacts.	All	Potential significance of impact unknown	There are several other energy projects and terrestrial development planned in the vicinity of the Morlais Development, including the Minesto Deep Green project and plans for residential and leisure facilities around Penrhos. The significance of the impact will be dependent on the final project design and the nature, extent and timescales of other relevant projects.

8.2 Land use and quality

This section outlines the baseline for land use and quality. As disturbance of land is a localised impact, this section focuses on the area of the landfall and substation location area with a brief description of general settings.

8.2.1 Baseline

Land use

The Scoping Area includes a mix of urban and rural land, with the main urban area of Holyhead being covering much of the onshore scoping area. Outside of Holyhead and of Penrhos the land is a mix of rural pasture and coastal heathland with some scattered settlements. Trearddur in the south of the scoping area is the only other settlement of note and is approximately 1.5 km south of the potential substation location.

The proposed land fall area is a partially industrialised area between Holyhead and Penrhos, with the grid connection being proposed at the currently unused Anglesey Aluminium works which stopped operating in 2009. The final location of the substation is likely to be adjacent to the Aluminium works and satellite imagery⁵⁴ shows that the area surrounding the Aluminium site is largely open land, although there are plans for significant development of this land.

The landfall is expected to come onshore through Penrhos Beach which is used for recreational purposes, However, behind the beach there an area of open land and the Penrhos Coastal Park. To the north west of Penrhos beach is a largely urban area and the location of Holyhead Harbour which is approximately 1km from the likely landfall site.

Directly west of Penrhos beach and overlooking the beach itself is the Llanfair Camping and Caravan Site. There are several developments proposed in the vicinity of the landfall and cable route⁵⁶ these include;

- The Land and Lake holiday resort which would be to the east and north of the landfall.
- Residential housing to the south of the Parc Cybi.
- Lateral Eco-Parks- a plan to convert the Anglesey Aluminium site and surrounding area into a biomass plant.
- Horizon Nuclear Power Plant- the development of a new nuclear power station on the site of the existing Wyfla.
- National Grid options for upgrading the grid.

Holyhead and Penrhos border each other with no clear definition between the two settlements other than some open land between the Anglesey Aluminium works and the east edge of Holyhead. As would be expected with an urban area, there is a substantial net work of roads within the onshore scoping area, including the A55, which is the main route across the Menai Straits, for access to Bangor and Wales.

⁵⁶ Morlais meeting with Local Authority, 12/01/2014

With the exception of Holyhead, Penrhos and Trearddur, the majority of Holy Island is rural and agricultural land with small settlements and individual dwellings.

Land quality

Most of the land within the onshore scoping area is covered by the urban area of Holyhead. In particular, the final location of the substation is likely to be in or adjacent to an already developed area. Therefore, much of the land within and adjacent to Holyhead would be considered already disturbed and brown field. The presence heavy industry in the form of the Anglesey Aluminium works may indicate possible historical land contamination.

Open and rural land in the onshore scoping area is likely to be undisturbed and historically farmed which would be unlikely to be significantly contaminated, although maybe degraded by agricultural processes.

The potential landfall location is currently a bathing beach and shows, historically, high water quality²⁴. Therefore, it is unlikely that this area will have significant levels of contamination.

8.2.2 Potential impacts

Table 8.3 Potential impacts on land use and quality

Potential impact	Phase	Anticipated significance	Comment
Nuisance or obstruction to land use from construction activities.	Construction	Potential significance of impact unknown.	Construction of the land fall, cable route and substation is not expected to be in areas of high residential activity, however, some local businesses may experience disruption, in particular, the Llanfair Camping and Caravan Park and other businesses adjacent to the final cable route.
Disturbance of contaminated land.	Construction	Potential significance of impact unknown.	It is assumed that land used for construction of the cable route and substation would be uncontaminated, however, the final locations may use brownfield land which would need to be assessed for possible contamination.
Loss of land by footprint of onshore substation.	Operational	Potential significance of impact unknown.	As the final location and size of the substation is not yet identified it is not possible to determine the potential

Potential impact	Phase	Anticipated significance	Comment
			impact.

8.2.3 EIA baseline characterisation strategy

Further information will be gathered to inform the EIA baseline. The baseline will focus on filling the following data gaps;

- The distribution of land use activities to determine potential impacts to other users. It is anticipated that this will be done through a mapping and desk study;
- Once the infrastructure locations are determined, the potential for contaminated land will be determined. This will be done through desk study based on historical land use and geophysical works once final locations are determined.
- Distribution of utilities and services to identify potential conflicts along the cable and substation location. This will largely be done via a GIS mapping exercise of available data.
- A review of roads and dwellings, including Noise Sensitive Properties (NSPs), this information will also be relevant for the noise assessment within the EIA.

8.3 Commercial fisheries

This section describes commercial fishing activity. Impacts on navigational safety are discussed in **Section 8.4**. The latest UK Sea Fisheries Statistics report has been used to inform this section ⁵⁷

8.3.1 Baseline

In 2013, there were 730 commercial fishermen recorded in Wales with Wales recording the lowest quantity of landings of all UK nations, at approximately 7,500 tonnes. Of this, 6,900 tonnes were shellfish and remainder was demersal fish.

In 2013, 42,000 Tonnes of landed fish (by UK fishing vessels) were reported as being sourced in the Irish Sea, which was the 5th largest catch figure for UK fishing areas. The Welsh fishing fleet has remained reasonably constant and has fluctuated between 465 and 483 vessels between 2010 and 2013 with 477 being recorded in 2013.

Holyhead is one of three commercial fishing ports in Wales which record landing statistics, with the other two being Milford Haven and Saundersfoot. In, 2013 Holyhead recorded 4,300 tonnes of landed shellfish with a reported value of £2.7 million. No demersal or pelagic fish were landed at Holyhead. The number of commercial vessels registered at Holyhead in April 2015⁵⁸ was six vessels below 10m and five vessels of greater than 10m. Of these, the longest was 17.58m.

In the nearby area, small numbers of less than 10m vessels are registered at Holy Island, Bangor, Almwch, Beaumaris and Caernarfon, these are typically local shell

⁵⁷ MMO (2013) UK Sea Fisheries Statistics. <https://www.gov.uk/government/statistical-data-sets/uk-sea-fisheries-annual-statistics-report-2013>

⁵⁸ MMO (2015) <https://www.gov.uk/government/collections/uk-vessel-lists>

fishing vessels, and with the exception of the five vessels registered at Holy Island, the offshore scoping area is likely to be beyond their local fishing areas. The five vessels registered at Holy Island are licenced shell fishing boats, however, they are not licenced scallop fishing vessels and they are likely to be mainly potting vessels targeting local crab and lobster. The Anglesey and surrounding area has long historic links with commercial fishing, however, the industry has been in decline over recent years.

Error! Reference source not found. indicates that fishing activity does occur in the offshore scoping area, however, this generally at a low level (less than 150 hours a year). The area immediately adjacent to Holyhead Harbour, including the offshore cable route approach has a low to moderate level of fishing activity, with approximately 250-500 hours per year.

The area of the Zone is expected to contain relatively hard, rocky seabed and complex hydrodynamic systems. As such, it is assumed to be of a relatively low value as a fishing area, although this will need to be confirmed through consultation and a more detailed review during the EIA.

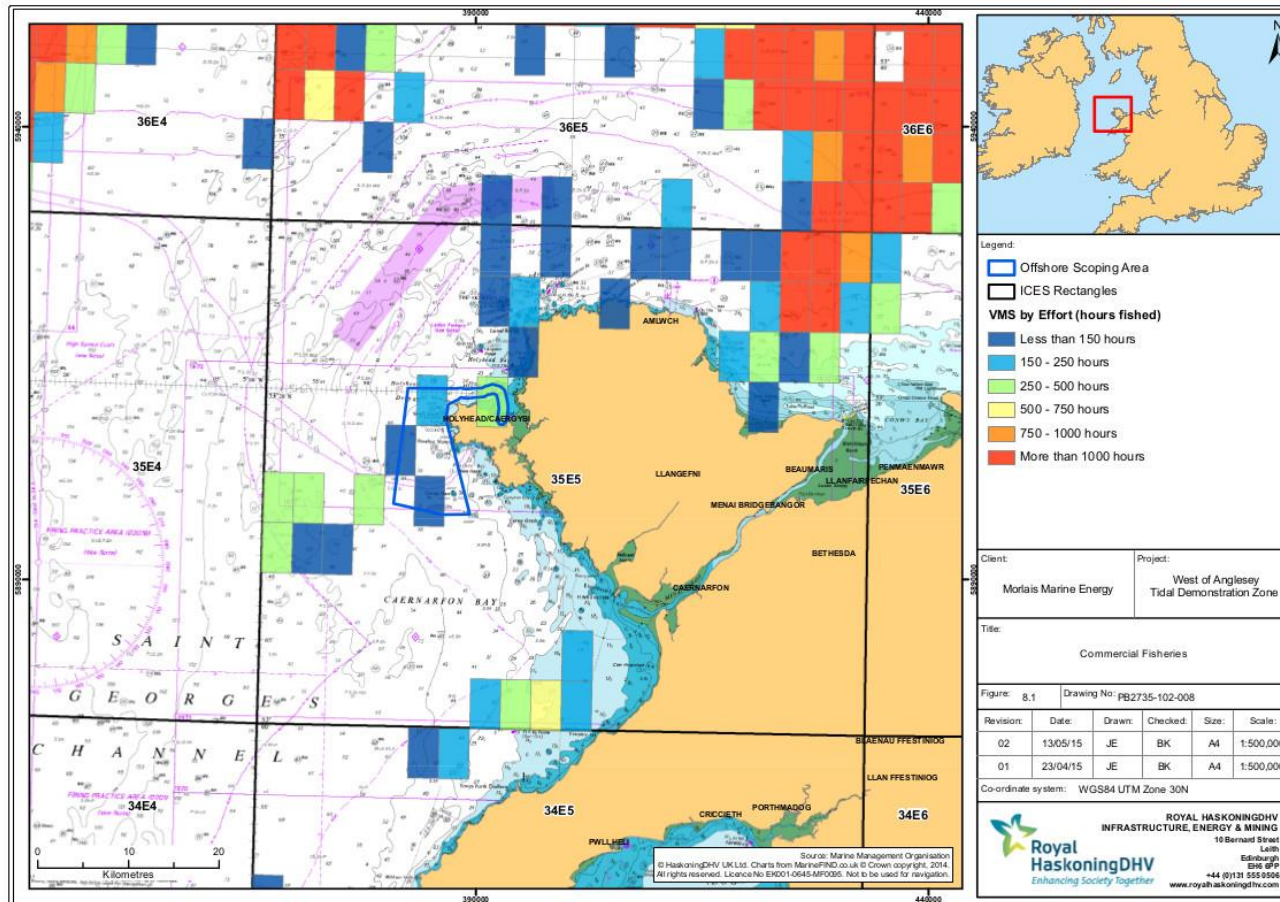


Figure 8.1 Commercial fishing activity within the offshore scoping area

8.3.2 Potential impacts

Table 8.4 Potential impacts on commercial fisheries

Potential impact	Phase	Anticipated significance	Comment
Loss of access to fishing grounds resulting from presence of devices, restrictions and exclusion zones.	All	Potential significance of impact unknown.	The potential loss of fishing ground due to the presence of the built project may result in loss of fishing resources and extended transits to alternative fishing area. The importance of the offshore scoping area to local fishermen is not fully understood and would need to be clarified during the EIA.
Obstruction to regular fishing vessel transit routes.	All	Potential significance of impact unknown.	Larger fishing vessels from Holyhead may transit through the offshore scoping area to access fishing grounds in the wider Irish Sea area. Local, small boat fishing boats may also transit through the offshore scoping area and adjacent coastal area. Obstructions to routes may result in longer transiting times.
Change in abundance of target species.	All	Potential significance of impact unknown.	The addition of new structures on the seabed may provide shelter and habitat for commercial target species. Morlais is currently undertaking a study to identify positive interactions and opportunities between marine renewable developments and the fishing industry. In particular, the study will focus on trying to identify and maximise the beneficial implications of the WADZ zone for local fishermen. .

8.3.3 EIA baseline characterisation strategy

In order to inform the baseline of the EIA, data gathering will focus on the following data gaps;

- Establishing the types and level of fishing activity within the offshore scoping area, the cable route and adjacent area through consultation with local fisheries associations, local fishermen and the MMO.
- Identify any areas that are important for fishing activity and determine how these areas are used within the footprint of any of the project components. This would be established through consultation with local fishing groups, representatives, stakeholders and the MMO.
- Establish transiting routes that transverse the offshore scoping area or the cable route and the frequency of crossings. This would be established through discussions and consultation with local stakeholders, local fishermen and industry representatives.

8.4 Shipping, navigation and marine infrastructure

This section outlines shipping and vessel navigation considerations within the Scoping Area.

8.4.1 Baseline

Shipping

The Holyhead to Dublin ferry sails out of the Holyhead Harbour, although this does not enter the WADZ, the route would cross the offshore export cable route shortly after passing the breakwater to the north east of Holyhead harbour. There are four daily sailings and two additional ferries, one that departs at 08:00 Tuesday to Saturday and one that departs at 20:00, Tuesday to Friday.

Annually there are approximately 8,000 ferry movements and approximately 500 other large vessel calls (bulk carrier, cruise liners coasters or large fishing vessel). The harbour has a 2.4km long breakwater and offers two sheltered anchorage area. There is a separate fish dock that services a fleet of small fishing vessels. The harbour is also used by recreational fishing vessels and small workboats⁵⁹.

Holyhead Harbour also contains a recreational marina and is a popular yachting location and mooring area.

Navigation

The cable corridor approaches the landfall along a similar route as vessels approaching Holyhead Harbour and there is likely to be some overlap, particularly as the cable navigates around the outer harbour wall. Holyhead Harbour is managed by Holyhead Harbour Authority and provides deep water berthing for cruise ships and transport vessels. The maximum keel depth of vessel accepted by Holyhead Harbour is 13.5m for

⁵⁹ UK Ports and Harbour Information. www.ports.org.uk, 2015. Accessed 21/04/2015

privately owned shipping and 7.0m for Roll on – Roll off (RoRo) vessels (<http://uk-ports.org/Holyhead>, 2015). The harbour approach and berthing is tidal dependent and there are some restrictions on berthing in weather conditions where winds are greater than 35-40 knots⁶⁰).

Error! Reference source not found. shows that there are potentially four cruise routes that cross through the WADZ with up to nine approaching Holyhead Harbour along approximately the same route as the export cable corridor. The offshore scoping area is also within a UK racing and UK sailing area with a major shipping route approximately 5km to the north at its nearest point.

Vessels approaching Holyhead Harbour from the south are likely to cross the offshore scoping area and may follow the route of the cable route as this would be the most efficient approach in terms of distance. Vessels approaching from the north and the west are likely to cross the offshore export cable route at the outer harbour wall to enter the harbour.

Marine infrastructure

The offshore area around west of Anglesey is generally undeveloped with no major built infrastructure such as platforms within the offshore scoping area or wider Irish Sea area. Error! Reference source not found. shows that there are two subsea cables (as reported by Kingfisher⁶¹) that cross the offshore scoping area and make landfall on the west coast of Holy Island.

⁶⁰ Holyhead Port- Navigational Guidelines (2015) <http://www.holyheadport.com/index.php/ferry-times/navigational-guidelines> Accessed 20/04/2015

⁶¹ Kingfisher subsea cable awareness <http://www.kis-orca.eu/downloads#.VT9rP6NwZ9> Accessed 20/04/2015.

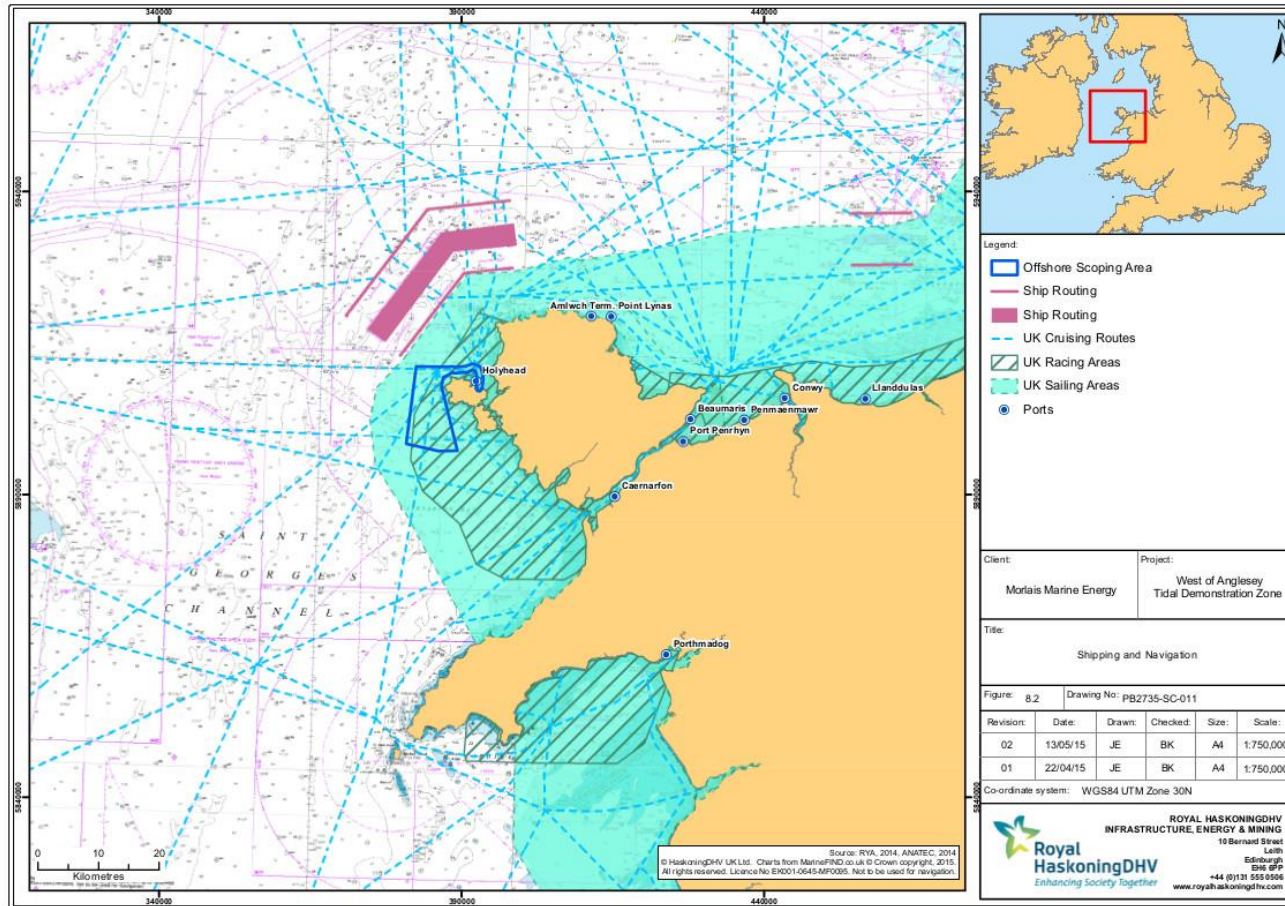


Figure 8.2 Shipping and navigation constraints within the offshore scoping area

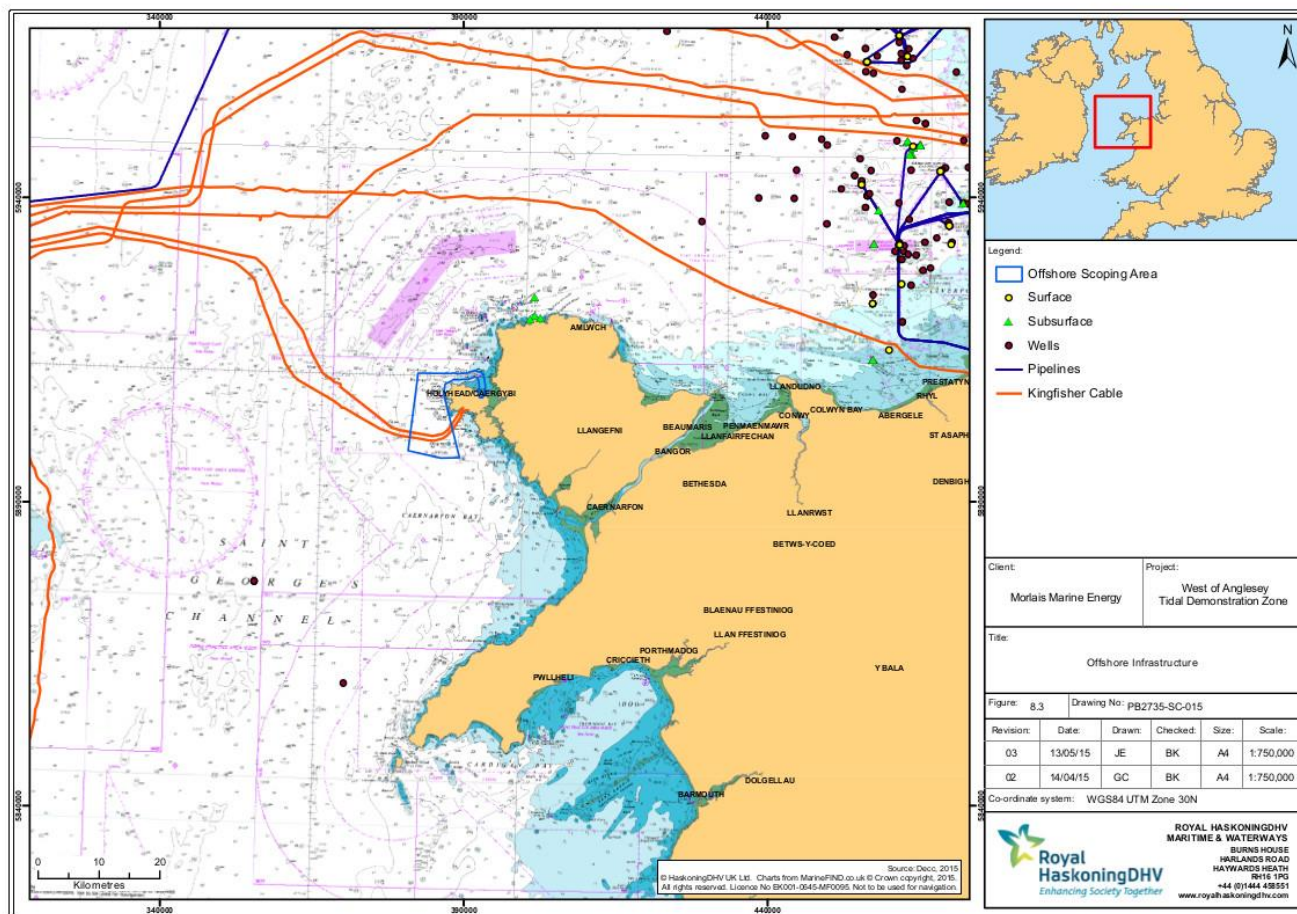


Figure 8.3 Marine infrastructure in the offshore scoping area

8.4.2 Potential impacts

Table 8.5 Potential impacts on shipping and navigation

Potential impact	Phase	Anticipated significance	Comment
Interaction of vessels with commercial, fishing and recreational vessels	All	Potential Significance of impact unknown.	During the construction phase the presence of installation vessels undertaking construction activities within the offshore scoping area have the potential to interfere with other marine users entering and leaving the harbour. During the operational phase, work boats within the Project may impact on other marine users. The significance of impact will be dependent on whether Holyhead is used as the construction port. There is also the potential for extending transiting time for fishing vessels and vessels leaving/approaching the Harbour from the south.
Impacts on navigational safety	All	Potential significance of impact unknown.	The installation and operation of TECs will reduce the navigable water depth within WADZ. If cable armouring is required, this would reduce the navigable water depth within the cable corridor.
Increased collision risk with other marine users	All	Potential significance of impact unknown.	The presence of additional vessels operating in the offshore scoping area has the potential to increase collision risk. The significance of the impact will be influenced by whether working and construction vessels are operating out of Holyhead Harbour.

8.4.3 EIA baseline characterisation strategy

In order to inform the baseline conditions for the EIA an initial desk study of existing AIS and vessel data collected previously in the study area will be undertaken, utilising existing data sets where available.

Where there are data gaps, these will be identified and addressed as appropriate.

8.5 Military activity

8.5.1 Baseline

RAF Valley is the only Ministry of Defence owned site on Anglesey and is to the south east of the offshore scoping area, to the north of Rhosniegr. RAF Valley is a training base for advanced fast jet for RAF and Royal Navy Pilots. RAF Valley was also formerly the operational base for a number of Sea King helicopters which provided a search and rescue role for the Irish Sea, Snowdonia and the wider North Wales area.

Figure 8.4 shows that the offshore scoping area is to the west of a Military Aerodrome Traffic Zone, with the potential for some overlap in the south east corner of the scoping area. The landfall and onshore infrastructure are within the traffic zone. The whole of Anglesey, the Llyn Peninsular and Snowdonia are covered by a regular military low flying area where mitigation may be necessary to resolve concerns. These concerns and any appropriate mitigation would need to be discussed through consultation with the MOD and RAF Valley. There is also a military practice and exercise area that covers some of the offshore area to the south west of the offshore scoping area.

There are no known naval exercise or live firing areas within or adjacent to the offshore or onshore scoping areas.

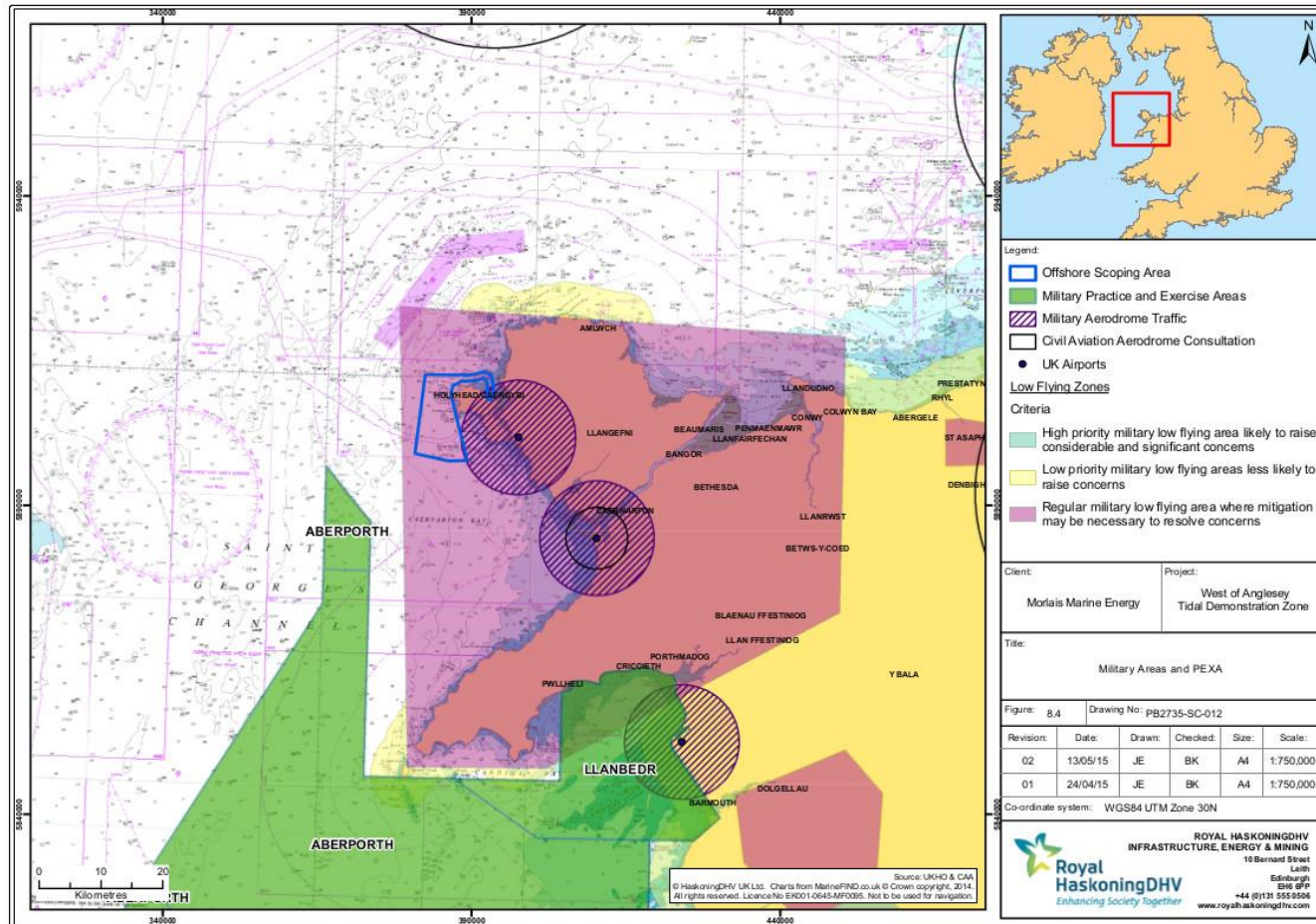


Figure 8.4 MOD constraints with the offshore and onshore scoping areas

8.5.2 Potential impacts

Table 8.6 Potential impacts on military activity

Potential impact	Phase	Anticipated significance	Comment
Interference with RAF Valley radar facilities		Potential significance of impact unknown	It is not anticipated that the presence of subsurface devices or surface piercing devices may influence RAF Valleys radar systems.

8.5.3 EIA baseline characterisation strategy

The EIA baseline will be informed through addressing the following data gaps;

- Identifying the likelihood of radar interference from surface piercing devices and substation. This would be done through a desk review of similar projects and consultation with the MOD.

8.6 Archaeology and cultural heritage

This section outlines the historical environment within the scoping area. The section is informed by historical records provided through Coflein historical records database⁶².

8.6.1 Baseline

Onshore

The onshore area directly inland of the landfall has relatively few historical records. The main ones being the Anglesey Aluminium Smelting works (20th century industrial record), the Ty Mawr Standing Stone and the Trefignath burial chamber. To the north east, of the aluminium works is the Penrhos Country House which has a cluster of outbuildings and folly's associated with it.

Holyhead itself has a large number of recorded historical interests which are typical of an industrialised urban area that has evolved around a port. There is a mix of periods and monument types represented within the historical records in the Holyhead urban area, including a windmill, bridges and port related infrastructure, although the majority of historical records are 19th century residential or commercial properties.

In the wider onshore scoping area outside of Holyhead the density of recorded monuments becomes lower and there is a wide variety of monument types recorded including; barrows, standing stones, farm houses, coastal ports, cairns and chapels.

On the west coast of Holy Island there are historical monuments overlooking the coast and seascape. Examples include burial cairns, country house, South Stack lighthouse

⁶² Coflein Historical records database <http://map.coflein.gov.uk/> accessed 24/054/2015

and Henborth Old Harbour. A full review of monuments with the potential to be impacted will be undertaken during the EIA,

Cable route

There are numerous wrecks recorded throughout the cable route, with approximately 17 recorded around the landfall alone, including HMS Nimrod. There is also a submerged forest recorded within the intertidal area of Penrhos Beach. There is a relatively high density of wrecks recorded within the harbour and nearby inshore waters. Outside of the harbour area the density of wrecks tends to be highest around the coastline and associated with coastal rocks. In particular, there are clusters of wrecks around the North and South Stacks.

Offshore

Holyhead Harbour is a historic harbour with a long maritime heritage. The waters around the west and north coast of Anglesey have a combination of a high energy wave and tidal regime with a rocky coastline and offshore rocks making it a particularly dangerous coastline in terms of shipping. Unsurprisingly, the coastal area adjacent to the offshore scoping area has a high number of reported wrecks. In addition, the historic presence of RAF Valley and low flying practice areas also increases the potential for submerged military aviation heritage to be present.

Within the offshore scoping area (not including the cable route) there are approximately seven recorded wrecks, including three aircraft of military origin.

8.6.2 Potential impacts

Table 8.7 Potential impacts on archaeology and cultural heritage

Potential impact	Phase	Anticipated significance	Comment
Impact on the historic land scape.	All	Potential impact significance unknown.	The presence of man made structures in previously undeveloped and historical settings has the potential to impact on the historical setting and landscape of a feature. The significance of the impact will be dependent on the importance of the historical setting and the final design nature of the Project. The onshore works are unlikely to have a significant impact as the substation and cable route are likely to be in an area of existing development with relatively few monuments.

Potential impact	Phase	Anticipated significance	Comment
Physical disturbance of submerged historic and prehistoric land surfaces and archaeological finds.	Construction/ decommissioning	Potential impact significance unknown.	There is the potential to disturb or damage submerged historical during device and cable installation. The potential for this is unknown and will require additional studies.
Physical disturbance of terrestrial historical artefacts.	Construction/ decommissioning	Potentials impact significance unknown.	There is the potential to disturb or damage buried unknown artefacts during cable burial or substation ground preparation works. This is particularly the case if works are being undertaken in previously undisturbed ground, however, the significance can be reduced through standard industry guidelines such as the use of a watching brief.
Indirect disturbance to submerged historic or prehistoric land surfaces and archaeological finds as a result of changes to the hydraulic and sedimentary regime.	Operation	Potential significance of impact unknown.	The significance of impact will be dependent on the nature of any changes to physical processes caused by the Project as well as the location and sensitivity of any historical interest features.

8.6.3 EIA baseline characterisation strategy

The EIA baseline would be informed by focusing on the following data gaps;

- The volume and nature of interest features with the potential to be impacted 1) visually, and 2) physically, by the construction or operation of the Project. This would be done through a thorough review of Coflein (National Monuments of Wales) and Archwillio historical data records (Gwynedd Archaeological Trust records). In addition to this, walk over survey maybe required. The importance of site would be assessed and the visual sensitivities considered. Assessments would be undertaken in accordance with latest industry guidance such as COWRIE Offshore Renewable Energy Sector Guidance for the Assessment of Cumulative Impacts on Historic Environment from offshore renewable energy projects.
- Review of subsurface historical interest features using existing bathymetric data and geophysical data. Anomalies would be identified by a marine archaeologist

to identify potential artefacts. Additional data analysis or gathering of sub-bottom profile data or magnetometer data may also be undertaken.

8.7 Noise and vibration

The following section discusses in-air noise and vibration within the onshore scoping area. Potential impacts on marine receptors from noise and vibration are discussed in the relevant receptor sections of this report. Potential sensitive marine receptors include marine mammals and some fish species.

8.7.1 Baseline

There is little site specific information on noise and vibration in the onshore scoping area.

The onshore components of the Project are likely to be located in areas of open land or existing business/industrial use and away from major residential noise receptors. The onshore construction area is expected to be on the edge of the Holyhead urban area near the Aluminium works. These areas would be expected to have moderate baseline noise levels, particularly with the presence of the A55 passing through the substation location area.

The area of the landfall would be expected to have a relatively low baseline noise levels given its nature. The Llanfair Camping Caravan Park that overlooks the likely landfall location may experience an increase in noise levels from baseline conditions during the land fall construction phase.

Holyhead Harbour is a focal point for industrial activity within the onshore scoping area. If it was decided to use Holyhead Harbour as the main construction port there would be increased vessel movement, industrial activities and road traffic to the Holyhead Harbour.

8.7.2 Potential impacts

Table 8.8 Potential impacts caused by noise and vibration

Potential impact	Phase	Anticipated significance	Comment
Increased noise from construction activities onshore.	Construction	Potential impact significance unknown.	Construction activities and increased traffic associated with construction may increase background noise levels. The significance of this would be dependent on existing conditions and the presence of sensitive noise receptors in the vicinity of the cable route or substation location.
Increased noise from	All	Potential impact	If Holyhead Harbour was chosen to be

Potential impact	Phase	Anticipated significance	Comment
use of Holyhead Harbour as main construction and operational port.		significance unknown.	used as the main construction port there would be an increase in construction based activities such as loading and unloading and engineering works which would be likely to increase in background noise levels. Additional road traffic transporting materials and personnel to the port would also increase road traffic noise, particularly in the vicinity of the harbour entrance. There would also be increased noise associated with vessel activity. If Holyhead Harbour was chosen as the operational port there would be some increase in noise associated with increased road traffic to the harbour and noise associated with vessel movements and activity.
Increased noise disturbance to visitors staying at Llanfair Caravan Park.	Construction	Potential impact significance unknown	There would be an increase in noise levels during the construction of the landfall and transition pit (if required). This may impact on the visitor to the Llanfair Camping and Caravan Park.
Increased vibration due to cable trenching and construction activities	Construction	Potential impact significance unknown	Construction activities such as HDD and trenching for the cable installation have the potential to cause vibrations. The significance of vibrations would be dependent on the chosen installation method and the presence of sensitive receptors.

8.7.3 EIA baseline characterisation strategy

The EIA baseline would be informed through the collection of data to address the following data gaps;

- Identification of baseline noise conditions. It is likely that this would be done through a combination of desk review and site specific survey.

- Identification of sensitive noise receptors. It is likely that this would be undertaken through a combination of desk review, consultation and site specific survey.

8.8 Air quality

This section outlines air quality within the scoping area. Little site specific information is available so this section is informed by air quality reporting from Anglesey as a whole.

8.8.1 Baseline

In general, air quality on Anglesey and more specifically Holy Island, is within the air quality objective of 40 µg/m³. During routine air quality monitoring (2012 & 2013), this air quality objective was only exceeded as one location which was at the kerbside of the A55 at Llanfair P.G. The value at this site was measured at 49.4 µg/m³⁶³ PM10 monitoring of four locations in Anglesey also recorded levels below the Welsh Governments 24 mean objective of 50µg/m³ and the annual mean of 40 µg/m³⁶⁴

Within the scoping area, Holyhead is only urban area with road significant road network and low levels of industry. Holyhead Harbour is likely to be a key source of CO₂, NO₂ and particulate matter within the scoping area, vessel and industrial activity within the harbour may cause hotspots of lower air quality, although there is little evidence that this exceeds the air quality objectives.

Offshore areas within and adjacent to the offshore scoping area are undeveloped and the only sources of emissions are onshore. Prevailing winds are unlikely to carry significant levels of air pollution to the offshore site. It is expected that air quality conditions are likely to have very low levels of emissions.

8.8.2 Potential impacts

Table 8.9 Potential impacts on air quality

Potential impact	Phase	Anticipated significance	Comment
Increased emissions onshore during construction.	Construction	Potential impact significance unknown.	Construction activities would be expected to result in increased levels of traffic to the onshore construction area. Increased traffic would be the result of both construction plant and construction workers traveling to the site. Increased traffic has the potential to result in increased emissions in the

⁶³ IoCC (2012) Air Quality Updating and Screening Assessment for IoCC.
<http://www.anglesey.gov.uk/download/33329>

⁶⁴ IoACC (2013) Air Quality Progress Report for IoACC.
<http://www.anglesey.gov.uk/download/38554>

Potential impact	Phase	Anticipated significance	Comment
			local area, although the significance of this will be dependent on the baseline conditions of the area. Construction activities, in particular, excavation works are likely to temporarily increase the levels of particulate matter and dust in the air. The significance of this will depend on the nature of the soils being excavated, the duration/volume of excavation and the existing baseline conditions.
Increased CO ₂ and NO ₂ emissions due to increased vessel and industrial activity at the Holyhead Harbour.	All	Potential impact significance unknown.	The significance of the impact will be dependent on whether Holyhead Harbour will be used as the main construction port. Increased vessel presence and activity would be expected to increase emissions from marine engines within the harbour. In addition, increased onshore activity from plant undertaking activities such as vessel loading and unloading and transportation of equipment may result in increased localised emissions and particulate matter. During operation, there is also the potential for increased emission through long term use of the harbour by work vessels. The significance of this will be dependent on the anticipated level of vessel activity during the construction phase.
Increased emissions offshore due to increased vessel activity.	All	Potential impact significance unknown- predicted to be not significant..	Increased vessel activity offshore would be expected to increase emissions from baseline conditions. Levels of emissions would be higher during construction with lower levels of vessel activity expected during operation. It is worth noting that levels of emissions are likely to be low to

Potential impact	Phase	Anticipated significance	Comment
			moderate and dispersal offshore is likely to be fairly rapid. It is therefore assumed that the significance of the impact would be not significant.
Long term reduction in CO ₂ emissions and contribution to meeting national emissions targets	Operational	Beneficial	The purpose of the Project is to contribute to the low carbon energy objectives of Wales and the UK in line with national policy. One of the main aims of the Development is to aid in progressing tidal technology towards widescale commercial roll-out and as such, is expected to have a positive contribution to national low carbon objectives.

8.8.3 EIA baseline characterisation strategy

In order to inform the baseline of the EIA, the following data gaps would be focused on;

- Site specific air quality information to inform the assessment. This would require a through literature review of existing baseline conditions and a site specific survey to determine baseline levels. Site specific survey would focus on onshore receptors around the Harbour, onshore cable route and substation location when known.

8.9 Tourism and recreation

8.9.1 Baseline

Holyhead is an international tourism and transport gateway into Wales and the UK⁶⁵ From 2011 to 2013 an average of 0.53 million trips⁶⁶ were taken to Anglesey. Tourism is Anglesey's most significant economic activity. Many tourists and visitors visit the Isle of Anglesey due to the recreational activities available and because of the island's countryside and, in particular, its undeveloped coastal environment. Potential impacts on the seascape and visual amenity are therefore intrinsically linked to the area's character and its ability to attract tourists and visitors. The effects on landscape, seascape and visual amenity are discussed in more detail in Section 8.1 – Seascape and Landscape while the implications on the amenity value of the area to locals and visitors is considered in this section.

⁶⁵ <http://www.anglesey.gov.uk/Journals/2014/02/19/w/o/f/HOLYHEAD-2020-VVP-SOP-STAGE-2.pdf>

⁶⁶ <http://gov.wales/docs/statistics/2014/140902-gb-tourist-statistics-2013-en.pdf>

The Anglesey coast and inshore areas are of high importance to various water sport enthusiasts including diving, angling, sailing and marine wildlife tours, as well as terrestrial recreation activities such as walking and discovering historic landmarks.

Since 2009, Holyhead has received visits from a large number of cruise liners berthing at Anglesey Aluminium Metals Ltd jetty. High spending passengers have boosted the local economy, with increasing numbers every year⁶⁷. There are approximately 2 million ferry passenger movements each year to and from Ireland also boosting the local economy.

Anglesey is a popular destination for sailing enthusiasts with a significant area of the west coast of Anglesey identified as a UK sailing and racing area. Recreational sea fishing is also an important activity in the scoping area, with both coastal fishing and chartered fishing vessels being popular activities.

8.9.2 Potential impacts

Table 8.10 Potential impacts on tourism and recreation

Potential impact	Phase	Anticipated significance	Comment
Offshore - Industrialisation of the local seascape reducing tourists, including sailing enthusiasts and sea fishing, visual amenity.	All	Potential significance of impact unknown.	Increased vessel activity at the offshore site and along cable routes during construction, within the context of existing shipping and marine energy related vessel activity in the area, is unlikely to have a significant effect. Vessel presence during operation and maintenance and decommissioning is likely to be minimal and of a temporary nature. The impact of any permanent surface piercing structures should be determined.
Onshore - Industrialisation of the local landscape reducing tourists' visual amenity.	All	Potential significance of impact unknown.	The installation and sustained presence of any substation and overhead grid infrastructure may reduce the visual amenity associated with an area.
Increased pressure on local temporary accommodation.	Construction and installation	Potential significance of impact unknown.	Increased personnel in Holyhead particularly during the construction phase, may put increased pressure on temporary accommodation, reducing

⁶⁷ <http://www.walesonline.co.uk/news/local-news/tourism-masterplan-140000-extra-visitors-2044700>

Potential impact	Phase	Anticipated significance	Comment
			availability for tourists during summer months when construction activities are planned.
Impacts on income and rental markets from incoming construction workers	Construction and operation	Beneficial	Incoming temporary construction workers are likely to require a range of accommodation types from B&B/hotel accommodation for short term workers to short and long term lets for longer term workers. This has the potential to boost the property rental markets within the area and provide increased and more stabilised income for B&Bs and hotels in the area, particularly if construction activity extends outside of peak tourist season. During the operation phase, long term workers are likely to want to find more permanent accommodation; this may result in a more buoyant long-term rental market. In addition, construction workers will spend some of their disposable income in the area. Morlais is committed to maximising beneficial impacts where possible.
Additional topic of interest creating new draw for tourists.	All	Beneficial	There is already significant interest in the renewables industry in North Wales through the presence of other projects and it is reasonable to assume that the industry may be a key area of interest for some visitors to the Islands. A project of this scale may contribute to this.
Increased vessel activity and industrialised activity at Holyhead Harbour creating a visual impact on tourists	All	Significance of impact unknown.	The presence of construction and work vessels, as well as industrial activities such as equipment lay down areas, loading and storage activity may increase the impression of industrialisation by visitors entering

Potential impact	Phase	Anticipated significance	Comment
arriving from sea.			North Wales by sea via Holyhead. The significance of this impact will depend on whether Holyhead is used as the main construction port and the level of construction and operational vessel activity expected.

8.9.3 EIA baseline characterisation strategy.

In order to inform the EIA baseline, the following data gaps will be focused on;

- Identify key tourist activities, the nature of tourist activity in Anglesey and detailed information of the economic aspects of tourism. This would include the amount of temporary accommodation available within commutable distance, the importance of tourism in terms of spend to the local economy (both direct and indirect) and the number of tourists staying on Anglesey as opposed to passing through on journeys to other destinations. This information would be gathered through a review of existing literature and publications from the IoACC and Welsh Government as well as consultation with local stakeholders and businesses.

8.10 Aviation

This section outlines the baseline aviation conditions within the scoping area and Holy Island.

8.10.1 Baseline

Anglesey has a single airport, Anglesey/Valley Airport, which is both an airport owned by the Isle of Anglesey County Council on land leased from Defence Infrastructure Organisation (DIO). The RAF Valley entity of the airport is run by the MOD. Details and potential impact for the RAF aviation activity were discussed in **Section 8.5**.

Anglesey Airport provides flights to Cardiff and is due to begin flights to Norwich in Spring 2015. Flights to Cardiff are twice daily with a total of 42 domestic flights per week.

Figure 8.4 indicates that there are no civilian aviation aerodrome consultation zones within the scoping area, the nearest one being at Caernarfon, however, consultation with RAF Valley would be required and it is assumed that this consultation would also include commercial aviation interests based at RAF Valley.

8.10.2 Potential impacts

Table 8.11 Potential impacts on aviation

Potential impact	Phase	Anticipated significance	Comment
Impacts on radar systems at RAF Valley.	Operation	Potential significance of impact unknown.	Although there will not be a substantial amount of surface piercing infrastructure, the impacts on radar equipment is not well understood and will be site specific. Consultation with RAF Valley will be required to determine the significance of the impact and potential mitigation measures.

8.10.3 EIA baseline characterisation strategy

In order to inform the EIA baseline, the following gaps would be focused on;

- Confirmation of the consultation strategy for commercial operators at RAF Valley, it is assumed that this will be through the Isle of Anglesey County Council as they are the airport operators. This consultation will identify key concerns and any requirements in addition to those raised by the MOD.

8.11 Traffic and transport

This section outlines the traffic and transport environment within the onshore scoping area.

Road network

The main access road is the A55 (North Wales Expressway) that runs directly to Holyhead. As well as providing access to local roads on Holy Island, the A55 provides access to Holyhead Harbour and the associated facilities.

From Holyhead Harbour (and train station) there are three route options to the Anglesey Aluminium works, the potential area for the onshore substation site.

- Victoria Road/A5154 → London Road/A55 → London Road/A5. Total of 2.2 miles, approximately 6 minutes.
- Victoria Road/A5154 → N Wales Exp/A55 → A5153 to Penrhos/A5. Total of 2.4 miles, approximately 6 minutes.
- Victoria Road/A5154 → Kingsland Road/B4545 → Cyttr Road → London Road/A5. Total of 2.6 miles, approximately 8 minutes.

London Road is directly behind Penrhos Beach which is likely to be the location for the landfall and would potentially need to be crossed by the onshore cable route. Depending

on the location of the substation, other roads may need to be crossed, including the A55.

Public transport

Holyhead rail station, provide North Wales and the wider rail network via the North Wales coastal line which operates between Chester and Holyhead.

Several vessel operators also operate regular ferries to Dublin and cruise services from Holyhead, these are discussed further in **Section 8.4**, Shipping and Navigation.

The following bus routes also operate within the onshore scoping area, connecting Holyhead with Anglesey and wider North Wales.

Holyhead to Anglesey Aluminium Metal Ltd

Bus services: 25 / 61 / X4 are from Summer Hill to Toll House (SE bound), 8 minute walk to Anglesey Aluminium Metal Ltd. These services are every 30 minutes. Total journey time of 18 minutes.

Anglesey Aluminium Metal Ltd to Holyhead

Bus services: 25 / 61 / X4 are from Toll House (NW bound) to Clock, 6 minute walk from Anglesey Aluminium works. These services are every 40 minutes. Total journey time of 16 minutes.

Holyhead to Penrhos

Bus services: 4 / 23 / 24 / 24A / 25 / 61 are from Railway station to Lon Deg (NE bound), 18 minute walk to Penrhos. These services are every 15 minutes. Total journey time of 21 minutes.

Bus services: 22A are from King's Road to Brantano, 18 minute walk to Penrhos. These services are every 20 minutes. Total journey time of 22 minutes.

Bus services: 21A / 23 / 24 / 24A / 25 / 61 / X4 are from Railway station to Holyhead Tesco, 15 minute walk to Penrhos. These services are every 15 minutes. Total journey time of 27 minutes.

Bus services: 4 / 21A / 23 / X4 are from Summer Hill to Bryn Era Road (SW bound), 17 minute walk to Penrhos. These services are every 20 minutes. Total journey time of 30 minutes.

Penrhos to Holyhead

Bus services: 22A / 23 / 24 / 24A / 25 / 61 / X4 are from Holyhead Tesco to Clock, 15 minute walk to Holyhead Tesco. These services are every 12 minutes. Total journey time of 21 minutes.

Bus services: 4 / 21A / 23 / X4 are from Bryn Era Road (SW bound) to Summer Hill, 17 minute walk to Bryn Era Road. These services are every 20 minutes. Total journey time of 22 minutes.

Bus services: 4 / 22A / 23 / 24 / 24A / 61 are from Lon Deg (NW bound) to Summer Hill, 19 minute walk to Lon Deg. These services are every 12 minutes. Total journey time of 24 minutes.

8.11.1 Potential impacts

Table 8.12 Potential impacts on traffic and transport

Potential impact	Phase	Anticipated significance	Comment
Disruption to local traffic and access.	Construction	Potential significance of impact unknown	The nature, duration and magnitude of effects will depend upon the methods by which construction materials, plant and personnel are transported to site.
Temporary increase in traffic.	Construction	Potential significance of impact unknown	Possible sporadic temporary driver delay and community effects during construction, potential for construction traffic.
Disruption to harbour related traffic	Construction	Potential significance of impact unknown	If the harbour is to be the main construction area, increased levels of construction traffic (both equipment and workers) has the potential to impact on other harbour users such as ferry passengers, tourists and workers at the harbour.
Disruption of traffic due to road crossings	Construction	Effect unlikely to be significant.	The grid connection route will potentially cross some roads. Significance of disruption will depend on the final crossing method, duration of disruption and the significance of road to road users.
Movement of abnormal loads (cable drums, transformers etc).	Construction	Potential significance of impact unknown	Movement of abnormal loads may require Special Order authorisation under Section 44 of the 1988 Road Traffic Act. This will be addressed prior to construction.
Permanent increase in traffic during	Operation	Effect unlikely to be significant	TIA (traffic impact assessment) may be necessary but it is anticipated that

Potential impact	Phase	Anticipated significance	Comment
operation,			standard road vehicles will be used in all operations associated with the onshore cable route construction activities.

8.11.2 EIA baseline characterisation strategy

In order to inform the EIA and any related traffic planning documents, the following data gaps will be focused on;

- Detailed traffic information to inform a traffic assessment to determine levels of disruption and appropriate mitigation. Data gathering for this would be based on a desk based review of available data sources such as Local Government Data Unit- Wales and IoACC public reports. It is likely that site specific traffic survey would need to be undertaken in the form of peak and average traffic flows.

8.12 Socio-economic

The information in this section is largely informed by data provided by the Local Government Data Unit in their 2013 Report⁶⁸ and data provided through the Anglesey Infobase website⁶⁹. Most of these data rely on the 2011 Census. Due to a lack of Holy Island specific data and as the socio-economic impacts can influence a wider area, data from Anglesey as a whole has been included.

8.12.1 Baseline

Population

The population of Anglesey in 2011 was 69,913 with an increase in population size of 0.31% between 2007 and 2011, this was generally lower than other counties in North Wales with the percentage population increase of North Wales as a whole being estimated at 1.3%⁶⁸. Long term population forecasts estimate a small decrease in population by 2036, this an estimated population size of 68, 053 by 2036 which equates to a decrease of 2.37%⁶⁹.

⁶⁸ LGDU (2013) Economic overview of the Isle of Anglesey- a data analysis of the Island. http://www.anglesey.gov.uk/Journals/2013/10/03/d/k/x/CPS24000_130606_V3_Anglesey_Economic_Overview_Report_2013.pdf.

⁶⁹ Anglesey InfoBase

<http://anglesey.infobasecymru.net/IAS/themes/angleseyinfigures/people/tabular?viewId=1188&geoId=1&subsetId=29> Accessed 22/04/2015

Employment

Employment statistics show that 73% of the working population of Anglesey were economically active in June 2011 with a continual rise to 77.3% by September 2012. During this period, economically active rates overtook those of Wales as a whole which remained level through this period and was 73.4% in September 2012 ⁶⁸.

In August 2012, 16.9% of the working age population were claiming benefits which was lower than the Welsh average of 18.2%. Multi-year monthly data on claimants of job seekers allowance in Anglesey show that there was an increasing trend in claimant with an increase of approximately 0.5% between August 2012 and February 2013 ⁶⁸.

Income

The average income for Anglesey in 2011 was £29,900 per annum which was 3.25% lower than the Welsh average of £31,425⁶⁹. Within the scoping area there were a wide range of average incomes recorded, however, for the majority of the onshore scoping area, income of between £34,787 and £44,259 was recorded in the 2011 Census ⁶⁸. However, some areas of Holyhead were within the lowest average income bracket of between £19,913 and £26,260.

Education

Statistics from the 2011 Census show that approximately 17.25% of the population between the ages of 20 and 24 were in full or part-time learning. The percentage of the population of working age with no formal qualifications has shown long term decline from 18% in 2006 to 13% in 2011, which is slightly above the Welsh national average of 12% in 2011.

Public Services

Public services within the onshore scoping area include daily ferries to Dublin from Holyhead harbour. Holyhead is also the final stop on the North Wales Coast Line which runs along the North Wales coast and connects to wider national services at Chester. There is also a regular bus route which connects Holyhead to Bangor on the mainland.

8.12.2 Potential impacts

Table 8.13 Potential impacts on socio-economics

Potential impact	Phase	Anticipated significance	Comment
Local employment and business opportunities	All	Beneficial	The development will result in significant opportunities for local residents and businesses throughout the projects lifecycle. Local opportunities will be maximised where identified.

Potential impact	Phase	Anticipated significance	Comment
Wage Inflation	All	Potential significance of impact unknown	The Project, alongside other energy projects may attract high wage earners to Anglesey, including the scoping area.
Improvements to infrastructure and facilities	All	Beneficial	The Project is expected to result in external investment to local infrastructure, including transport network, Holyhead Harbour and public services.
Population increase	All	Potential significance of impact unknown	The Project will create jobs which may cause a migration of workers to the area, initially for the construction phase but potentially for skilled, long term employment during the operational phase.
Change in Population distribution	All	Potential significance of impact unknown	Workers employed directly or indirectly as a result of the project may relocate to be closer to the Project. Including the onshore scoping area and wider Anglesey and North Wales area.
House Price Inflation	All	Potential significance of impact unknown	An influx in workers into the area could result in a higher house or rental prices depending on the availability of homes and relocation preferences. This could benefit existing home owners but have negative implications for first time buyers.
Pressure on local utility services	All	Potential significance of impact unknown	Increases in population through worker migration could lead to additional pressures on local services.
Improvements to local transport services	All	Beneficial	Increased population through worker migration may result in increased demand on public transport which may lead to additional investment.

8.12.3 EIA baseline characterisation strategy

Further information is required to provide a more detailed baseline for the EIA. For the EIA, data gathering to inform the baseline would potentially include;

- Gather Census data and other sources to attain up to date population information on population numbers and distribution.
- A survey of local businesses and discussions with business opportunities to gather more detail on employment, income and labour availability.
- Discussions with local business and business opportunities to ascertain capabilities for a local supply chain. Review of industry generated papers and research (eg. Crown Estate Socio-Economic Projects).
- Discussions with local housing association, housing developers and a review of local housing and rental market to ascertain further information on housing availability and pricing; and
- Desk review of local investment plans.

9 SUMMARY OF BASELINE CONDITIONS

9.1 Physical environment

The offshore environment around Anglesey is driven by exposed wave conditions and strong tidal regimes. These drive coastal geological and sediment transportation processes along the west coast of Holy Island and within the WADZ area. The coastal area around Holyhead is relatively sheltered area only receiving direct waves from a north or north west direction. The coast around Holy Island is typically a mix of rocky headland and cliffs, interspersed with sand bays, with some areas of extended sand and soft clay cliffs around estuaries.

The onshore environment is a mix of developed and rural areas. Holyhead Mountain is predominant geological feature. In the area of the likely onshore cable route and substation location it is expected that the area will consist of a low topography with shallow topsoil and limited hydrological receptors.

9.2 Designated sites and biological environment

Holy Island, Anglesey and the wider North Wales area is a relatively undisturbed and undeveloped area and has important terrestrial and coastal ecological area. Anglesey support a high diversity of coastal bird species with important coastal breeding sites for auk, gull and terns as well as a potential foraging ground for birds from SPAs further away.

The offshore scoping area is potentially of moderate importance to grey seal and harbour porpoise but likely to be of low importance to other marine megafauna. It is also not likely to be of particular importance to fish species of commercial or natural heritage importance.

Onshore, there are some important ecological habitats within the scoping area; in particular, the Penrhos Coastal Park is likely to be an important ecological area as it provides the largest area of woodland on Anglesey. As much of the works is expected to be undertaken around the Anglesey Aluminium works it is anticipated that the land will not be of high ecological importance.

9.3 Human environment

The offshore scoping area is used by recreational sailors and is a UK sailing and racing area. Up to nine cruise routes also go through the offshore scoping area to approach Holyhead Harbour. In terms of commercial fishing, the area is not heavily fished, although small local shell fishing vessels are likely to use the area. The coastal area is an important recreational area and views of undeveloped seascapes are valued by recreational visitors. Holyhead Harbour is a key economic driver and brings significant amounts of tourists into Anglesey and North Wales from ferries from Ireland and regular cruise stop-offs. The Harbour is also important as a commercial loading and unloading area.

The onshore scoping area has a mix of urban and rural environments with a significant road network in and around Holyhead, including the A55 which is the main route to the mainland. Tourism is an important economic driver in Anglesey. RAF Valley is

positioned on the west coast of Anglesey and both offshore and onshore scoping areas are under a low level military flying area.

10 CUMULATIVE IMPACTS AND IN-COMBINATION EFFECTS

10.1.1 Baseline

Offshore

The Minesto Deep Green Project is a tidal demonstration project that is proposed in the Holyhead Deep. The project will consist of three 0.5MW fully submerged TECs.

In total Minesto has been awarded a 10MF AfL Installation will take place between Q3 in 2016 and end in approximately Q2 2017. It is proposed that the export cable from the Minesto project links with that of the Morlais project and that both projects have a joint landfall and onshore infrastructure. The overall duration of the development will be 10 years.

Onshore

The following developments are being proposed within the onshore cable route and would need to be considered in terms of onshore cumulative impacts;

- The Land and Lake holiday resort, which would be to the east and north of the landfall.
- Residential housing to the south of the Parc Cybi.
- Lateral Eco-Parks- a plan to convert the Anglesey Aluminium site and surrounding area into a biomass plant.
- Horizon Nuclear Power Plant- the development of a new nuclear power station on the site of the existing Wyfla.
- National Grid options for upgrading the grid.

The preferred approach is for Morlais and Minesto to share a single cable route, substation and grid connection. This approach would minimise disruption to other land users and minimise disruption to roads from crossings and traffic movements associated with onshore construction.

10.1.2 Potential impacts

Table 10.1 Potential impacts due to cumulative impacts

Potential impact	Phase	Anticipated significance	Comment
Cumulative impacts on offshore construction of developments.	Construction and operation	Significance of impact unknown	<p>There could be cumulative impacts on a range of topics that would need further consideration, these would include;</p> <ul style="list-style-type: none"> - Physical processes; - Benthic ecology; - Marine megafauna; - Ornithology; - Fish and migratory fish; - Designated sites ; - Shipping and Navigation; - Commercial fisheries; - Traffic and transport (associated with harbour activities) - Seascape; and - Socio-economics.
Cumulative impacts on onshore construction and operation of developments.	Construction	Significance of impact unknown	<p>As the onshore infrastructure is proposed to be the same for both projects there should be no additional impact onshore, with the exception of</p> <ul style="list-style-type: none"> - Socio-economic, and - Traffic and transport.

10.1.3 Proposed approach for cumulative impact assessment

Scope of CIA

The cumulative impact assessment (CIA) will focus on;

- Relevant projects that have been consented and are yet to be constructed;
- Relevant projects for which an application has been submitted but which are not yet consented; and

- Wave and tidal energy projects for which a Scoping Report has been submitted (although any assessment made in relation to such projects is likely to be qualitative).

It is proposed that, depending on the outcome of initial scoping, the types of projects that would be considered in the CIA would include;

- Tidal energy projects;
- Wave energy projects;
- Offshore wind energy projects;
- Offshore infrastructure projects;
- Oil and gas developments;
- Aquaculture (new applications/reviews);
- Dredging;
- Coastal developments;
- Onshore infrastructure projects; and
- Onshore wind energy projects.

All receptors that are to be considered as part of the EIA will initially be considered as part of the CIA, with a view to remove receptors from the scope where no pathway is predicted. The CIA will be undertaken following the same processes and methodology used during the EIA.

CIA assessment

Once relevant sources and receptors have been identified, possible pathways will be identified. Where no pathways exist cumulative impacts can be ruled out. The spatial extent and refinement of projects will be informed through this 'screening' process. The scope of the CIA would be agreed through consultation with MMO and NRW.

11 PROPOSED EIA METHODOLOGY

It is anticipated that an EIA will be required for the Morlais Demonstration Zone Project. This section sets out the proposed EIA stages;

11.1 EIA process

The EIA would consist of the following stages:

- 1) Baseline data collection to characterise the existing environment using existing literature and specialist studies.
- 2) Specialist studies to undertake site specific studies in order to provide further information of parameters which may be subject to significant effects.
- 3) Impact assessment which uses information used to inform the baseline in order to evaluate and predict the impact on the existing environment, the significance of the impact on the environment and the significance of cumulative and in-combination effects.
- 4) Mitigation and optimisation to identify appropriate and practical mitigation measures to reduce significant effects.
- 5) Production of the environmental statement to report the findings of the EIA and provide a non-technical summary.
- 6) Pre-application consultation which includes discussions with stakeholders and advertisement of the application.
- 7) Post-submission consultation to resolve concerns, objections or data gaps.

11.2 The Environmental Statement

The findings of the EIA are presented in a written Environmental Statement (ES), which will include the following information.

1.1.1 Introductory Chapters

1) Overview of Renewable Energy and Project Introduction-
An introduction to renewable energy development and in particular, tidal power will be outlined providing an overview of the potential benefits of the development in terms of reduced emissions. It will also outline the project drivers, aims and objectives.

2) Overview of EIA Methodology
Will include an overview of the impact assessment methodology used for the EIA process including scoping and consultation and the identification of key environmental effects.

3) Site Selection Process
A description of the site selection process for the tidal array and grid connection route will be outlined.

4) Project Description
Details of the site and a description of the proposed tidal array will be discussed. This will include details of the possible size, layout and design of the site and associated onshore/offshore infrastructure. This chapter will also outline the construction, installation, operational, maintenance and decommissioning requirements of the Project.

5) Policy and Legislation

This section will present an overview of the relevant statutory planning guidance and Development Plan policies which apply to the proposed development.

11.2.1 EIA Results

Physical Environment

- Metocean conditions
- Marine water and sediment quality; and
- Geomorphology soils and hydrology.

Designated Sites and Biological Environment⁷⁰

- Natural heritage designated sites;
- Benthic ecology;
- Marine mammals, basking sharks and reptiles;
- Fish and shellfish;
- Ornithology;
- Terrestrial and coastal ecology.

Human Environment

- Seascape and landscape;
- Land use and quality;
- Commercial fisheries;
- Shipping and navigation and other marine users;
- Military activity;
- Archaeology and cultural heritage;
- Noise and vibration
- Air quality
- Tourism and recreation
- Aviation
- Traffic and transport;
- Other renewables;
- Local communities and socio-economics;

Each topic chapter will describe the approach taken to impact assessment. This will include an outline of relevant consultations undertaken, documentation studied and the means of defining the Area of Search for that topic. Should there be any difficulties (technical deficiencies or lack of know-how) encountered in compiling the required information, this will be noted. The existing baseline conditions for the topic will then be described. An assessment will then be made of the nature, magnitude, duration and significance of the likely effects of the construction, operation, maintenance, and decommissioning of the proposed development on the topic.

Mitigation measures to avoid, minimise, or remedy the predicted effects, where practical, will be outlined. An assessment will be made of the significance of the likely residual effect, following mitigation.

⁷⁰ Designated sites to be included as either a stand alone chapter or within receptor specific chapters.

Potential cumulative effects will be discussed within each EIA topic chapter, and summarised in Volume IV Cumulative Effects volume.

11.2.2 Topics to be scoped out

We would look to scope the following topics out of the EIA.

Physical Processes-

- Reduced energy in tidal currents from energy removed by tidal devices – previous studies for other projects such as PTEC and SeaGen have found little evidence of significant changes to tidal strength downstream of devices and have predicted no significant impacts on coastal processes.
- Changes to wave climate from submerged and surface piercing infrastructure— EIA and monitoring studies from other surface piercing technologies, namely offshore wind, have found no evidence to suggest that surface piercing devices significantly alter wave climate or strength inshore of project areas.

Geology

- Due to the limited nature of the onshore development it is anticipated that there would be no impacts on the geology environment.