MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 1 - META HRA Screening Report

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1 Introduction

1.1 Overview and Purpose of this Report

This document accompanies Marine Energy Wales' (MEW's) application to the relevant regulatory authorities for consent for the Marine Energy Test Areas (META) Project. Marine Energy Wales (MEW) intend to provide a suite of offshore marine energy test sites within, and in proximity to, the Milford Haven Waterway (hereafter referred to as 'the Waterway'), to facilitate the testing of marine energy component, sub-assembly, instrumentation and marine renewable devices, including trialling installation, retrieval and decommissioning methodologies and operation and management activities.

This will allow developers to test procedures and engineering solutions in a wide range of environmental conditions thereby de-risking marine energy projects prior to larger scale or array deployments.

This proposal, known as the META Project will provide marine renewable energy device developers with pre-consented testing sites, which will reduce consenting time and financial burdens, and enable device developers to focus on the technical aspects of device development. META's aim is therefore to provide a series of pre-consented, non-grid connected, marine energy test areas that will allow for the deployment and testing of devices, components and subassemblies, and ancillary activities and equipment, in support of marine energy testing.

The Conservation of Habitats and Species Regulations 2017 (hereafter the 'Habitats Regulations') stipulate that a Habitats Regulations Assessment (HRA) must be carried out on all plans and projects that have the potential to impact upon sites designated for supporting habitats or species of international importance, otherwise known as Natura 2000 or European designated sites. In the UK, the requirements of the Habitats Regulations are also extended to consider the effects on Ramsar sites (listed under the Ramsar Convention on Wetlands of International Importance). The presence of Natura 2000/Ramsar sites, and the potential impacts that could occur as a result of the installation/construction, operation and maintenance, or decommissioning of the META Project, will therefore require assessment under the Habitats Regulations.

The European Commission's guidance on Planning for the Protection of European Sites: Appropriate Assessment (2001), identifies a staged process to the assessment of the effects of plans or projects on European sites. In England and Wales, cumulatively these stages are referred to as a Habitat Regulations Assessment (HRA), in order to clearly distinguish the whole process from the second stage within it, which is referred to as the 'appropriate assessment'. There are potentially up to four stages of an HRA:

i. Screening;
ii. Appropriate Assessment;
iii. Mitigation and alternatives; and
iv. Imperative Reasons of Overriding Public Interest (IROPI).

This document represents MEW's HRA Screening under Section 63(1-2) of the Conservation of Habitats and Species Regulations 2017 for the META Project (as descried in Section 1.2). It comprises the Screening Stage and therefore provides information to enable the screening of the META Project with respect to its potential to have a likely significant effect (LSE) on European sites of nature conservation importance. LSE is, in this context, any effect that may be reasonably predicted as a consequence of a project that may affect the conservation objectives of the features for which the European site was designated, excluding trivial or inconsequential effects. It is important to note that this is different from Likely Significant Effect (also often referred to as LSE) as defined by the Environmental Impact Assessment (EIA) Regulations 2017.

1.2 Project Overview

Three META sites have been screened into the requirement to undertake an EIA, on the basis that the activities proposed at these sites are consistent with the characteristics of a Schedule 2 project under the Marine Works (EIA) Regulations 2007 (as amended). That is, a project which is likely to have significant effects on the environment due to factors such as its size, nature or location. The META sites which will require an EIA and consideration within the HRA are outlined below and shown in Figure 1.1:

- Warrior Way (site 6);
- Dale Roads (site 7); and
- East Pickard Bay (site 8).

1.2.1 Warrior Way

Warrior Way is located within the Waterway offshore from the Pembrokeshire Science and Technology Park, south east of Pembroke Ferry, and at the mouth of the Cosheston Pill. The site supports the greatest tidal resource in the Milford Haven Estuary (1.2 m/s) and has a depth of between 16-19 m. The Warrior Way site encompasses an area of 93,000 m^2 (9.3 Ha) and lies entirely within the Pembrokeshire Marine/Sir Benfro Forol Special Area of Conservation (SAC). Figure 1.2 illustrates the location and extent of Warrior Way in relation to the surrounding Milford Haven and Pembrokeshire infrastructure and environmental designated sites.

The Warrior Way site will enable testing of:

- Scaled tidal devices,
- Micro tidal devices,
- Instruments, components and subassemblies;
- ROV or other monitoring equipment;
- Site preparation methodologies;
- Decommissioning methodologies; and
- Salvage methodologies.

1.2.2 Dale Roads

The Dale Roads site lies outside the Dale shelf anchorage within the Waterway to the west of Great Castle Head, and south of St Ishmael's. It supports depths of between 8 and 12 m and benefits from a significant wind and wave fetch from the south and southwest. The site encompasses an area of 195,565 m^2 (19.56 Ha) and lies entirely within the Pembrokeshire Marine/ Sir Benfro Forol SAC. Figure 1.3 illustrates the location and extent of Dale Roads in relation to the surrounding Milford Haven and Pembrokeshire infrastructure and environmental designated sites.

Dale Roads will enable testing of:

- Scaled wave energy converter (WEC) devices;
- Full-scale WEC devices; and
- Research and monitoring methodologies.

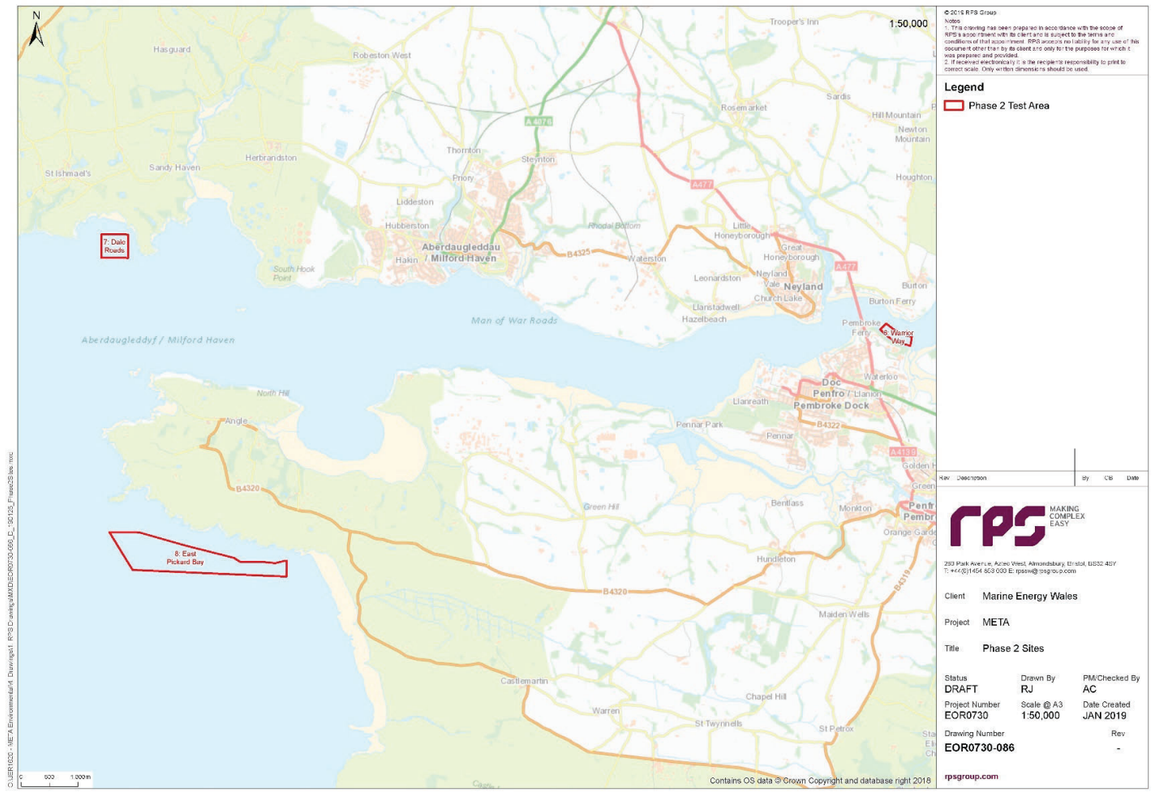

Figure 1-1: Proposed META Project (Phase 2) test sites.

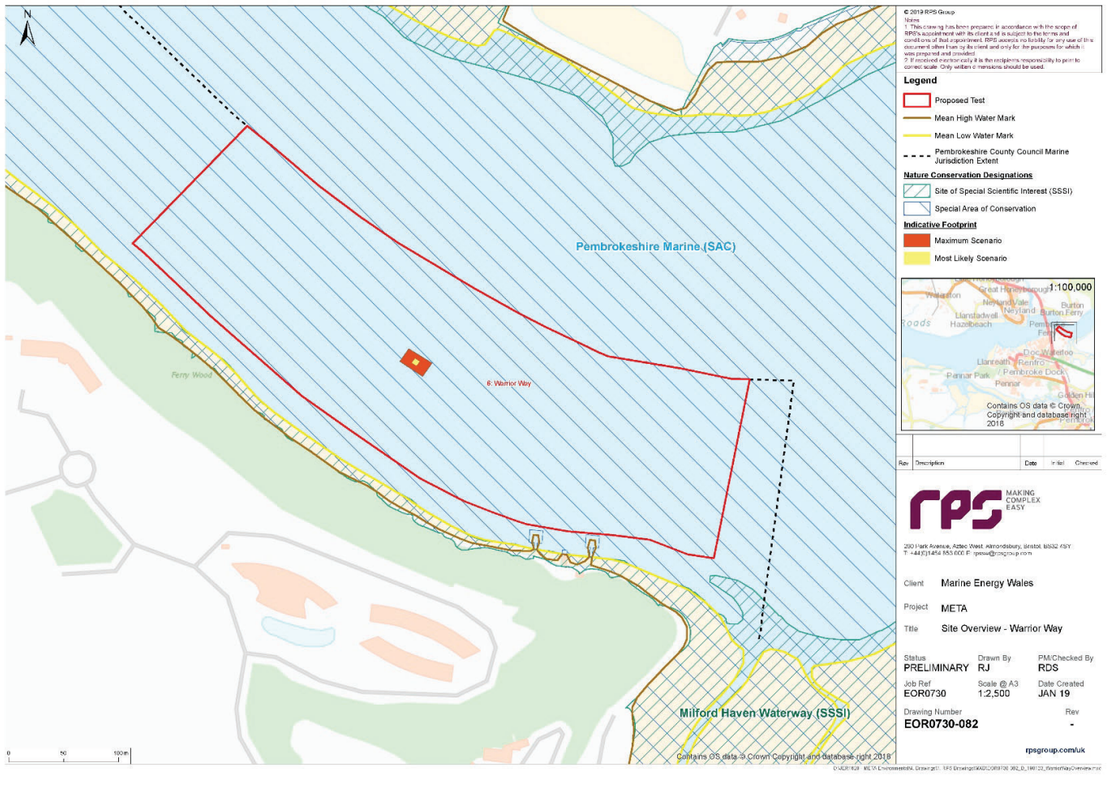

Figure 1-2: Location of Warrior Way (Site 6).

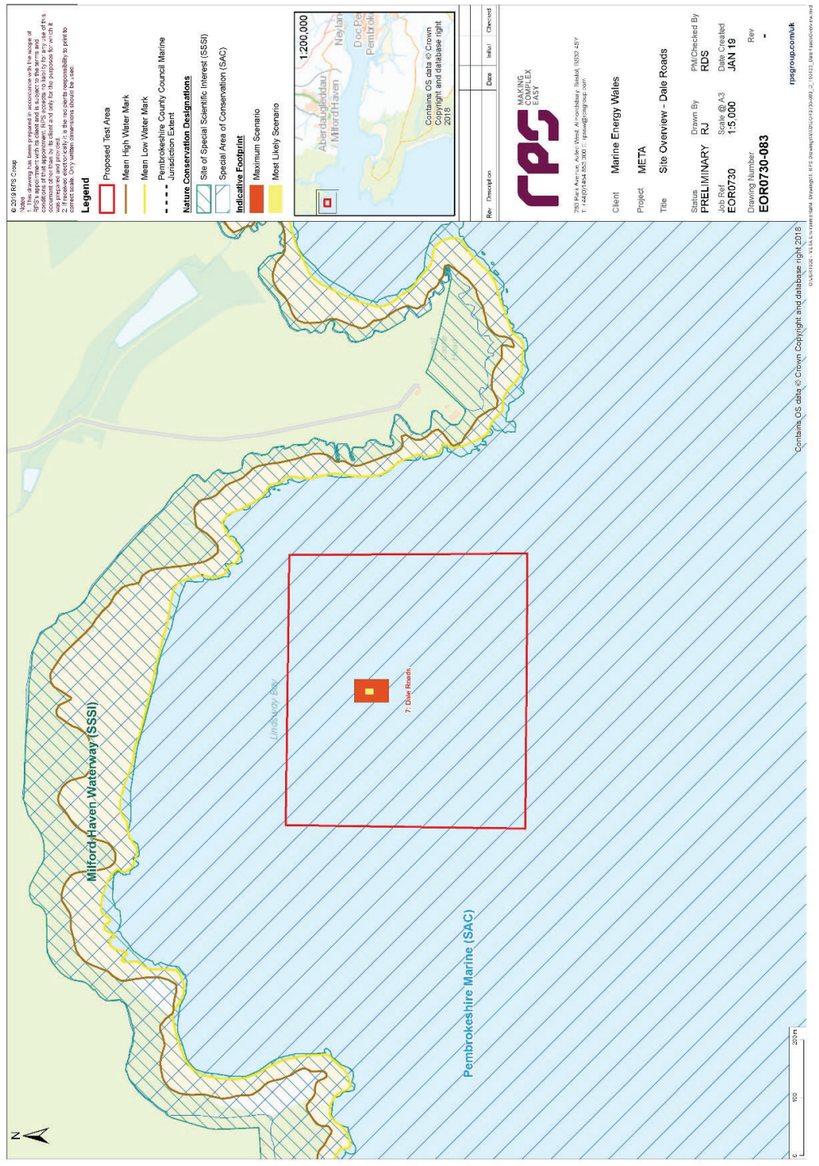

Figure 1-3: Location of Dale Roads (Site 7).

1.2.3 East Pickard Bay

The north-west side of the East Pickard Bay site overlaps with the southern boundary of the Waterway. It lies immediately south of Sheep Island and runs south-eastward parallel to the coast towards Freshwater West Bay.

The META offshore site is exposed to a good wave resource benefiting from a 200 km fetch from the prevailing wind direction and has a water depth of between 10 and 29 m. The East Pickard Bay site encompasses an area of 1,230,000 m^2 (123 Ha) and lies entirely within the Pembrokeshire Marine/ Sir Benfro Forol SAC and the West Wales Marine candidate SAC (cSAC) proposed for harbour porpoise. Figure 1.4 illustrates the location and extent of East Pickard Bay in relation to the surrounding Milford Haven and Pembrokeshire infrastructure and environmental designated sites. Figure 1.5 illustrates the location of a temporary marine cable at East Pickard Bay (site 8) and associated marine survey area.

The East Pickard Bay site will enable testing of:

- Full-scale WEC device testing;
- Scaled wave energy WEC device testing; and
- Component testing for floating offshore wind technology.

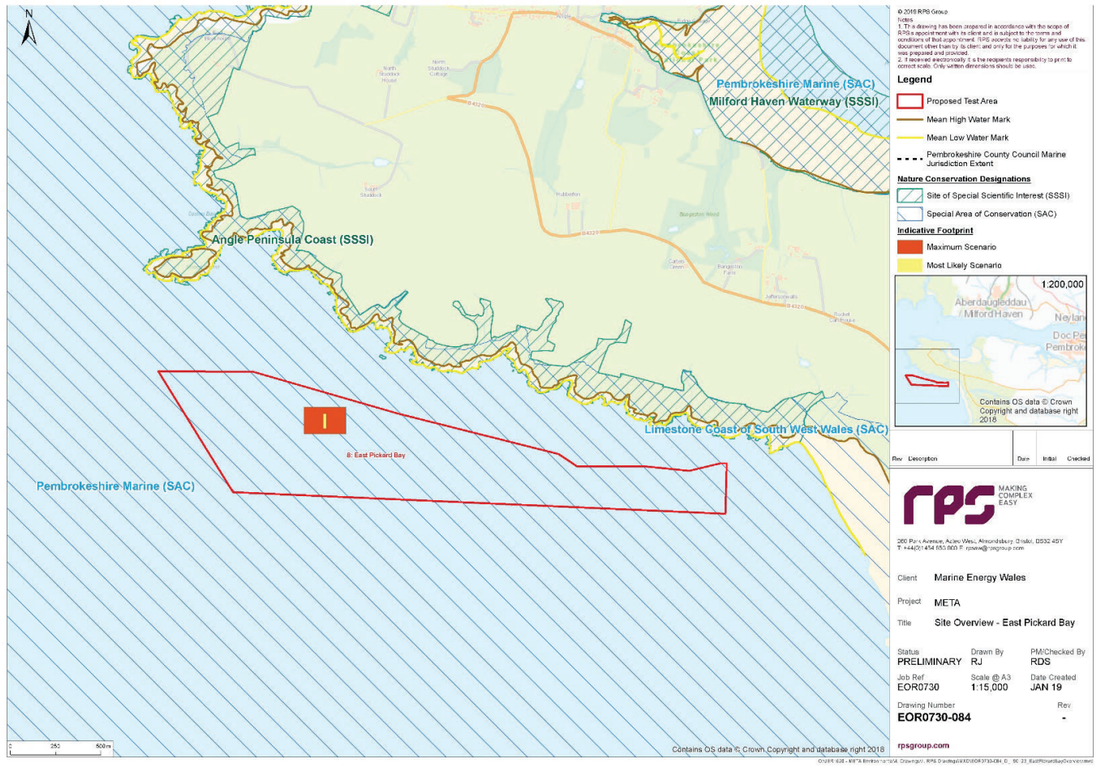

Figure 1-4: Location of East Pickard Bay (Site 8).

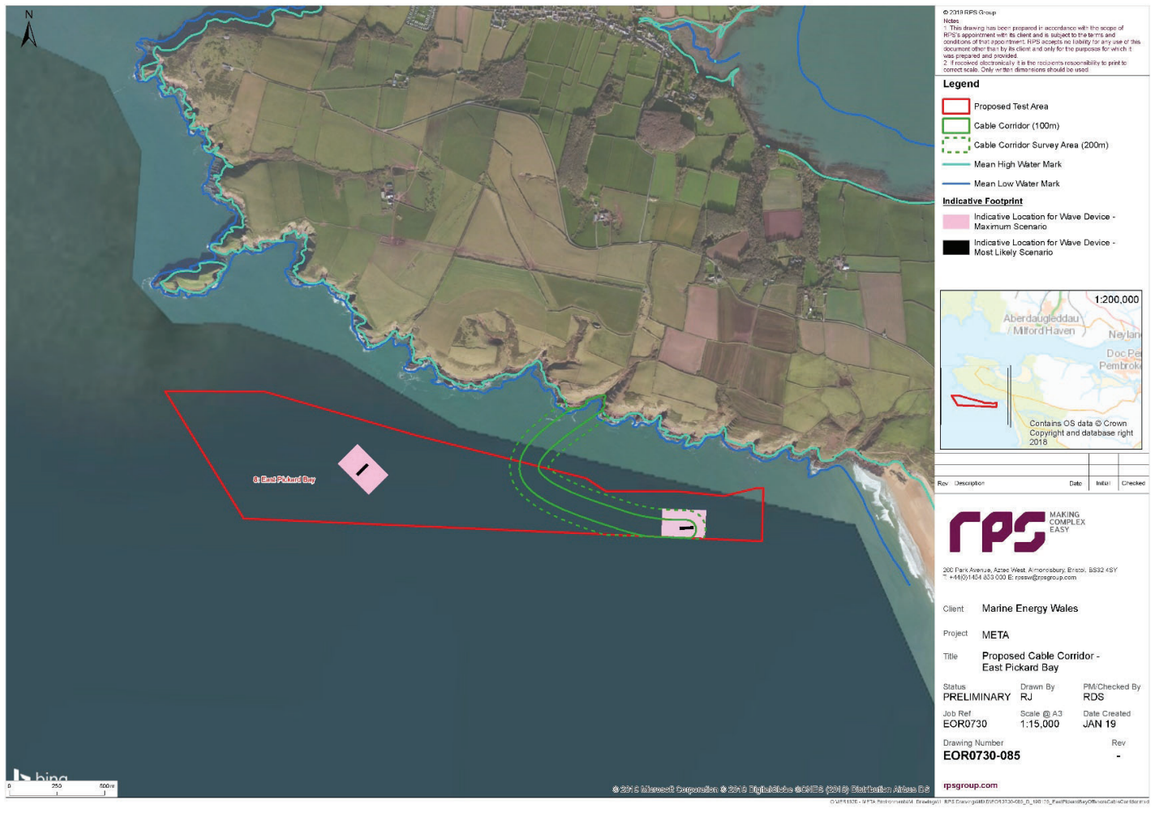

Figure 1-5: East Pickard Bay (Site 8), marine cable route search area (up to MHWS).

1.3 Project Design Envelope

The following sections provide a description of the Project Design Envelope (PDE) for the three META sites considered in the HRA.

1.3.1 Warrior Way

Overview

MEW will provide an Acoustic Doppler Current Profilers (ADCP) and a test support buoy at Warrior Way to support testing at this site.

The site does not have the capacity or area to support full-scale tidal devices other than micro full-scale devices, therefore full-scale tidal device deployment will not be supported at the Warrior Way site.

The maximum testing scenario at Warrior Way is up to one activity test at any one time.

Devices may be attached to developers' own moorings, deployed on the seabed, or deployed from a floating platform or vessel. Piling or pin piling will not occur at Warrior Way. This is in part due to the potential for impact on migratory fish as a notified interest feature of the Cleddau River/Afonydd Cleddau and Pembrokeshire Marine/Sir Benfro Forol SACs and marine mammals as a notified interest of the Pembrokeshire Marine/Sir Benfro Forol SAC and West Wales Marine/Gorllewin Cymru Forol cSAC.

Testing may include floating surface structures, surface piercing structures, sub-surface testing and/or seabed mounted structures and devices may yaw according to local current and tidal conditions, as well as movement of large vessels in proximity to the test site, and therefore may experience up to 360° yaw.

Devices for operational testing at Warrior Way are likely to be towed to site and installed on pre-prepared foundations or attached to a floating platform or test support buoy.

Energy generation may occur during test deployments at Warrior Way, therefore Warrior Way will be included in the Section 36 (S.36) consent as required under Electricity Act 1989. This S.36 consent will include Warrior Way (Site 6), Dale Roads (Site 7) and East Pickard Bay (Site 8). Generation capacity (up to 10 MW) will be spread between these three sites allowing flexibility in deployment options. Any heat generated from operational testing will be minimal and restricted to the consented footprint of the site.

Communication and power to support the tests proposed will be provided locally at Warrior Way as and when necessary; this will not require the installation of any permanent infrastructure to support the testing. Similarly, a grid emulation system may be provided at Warrior Way on a project-by-project basis and will not require the installation of any permanent infrastructure.

Operational testing at Warrior Way may be throughout the year (will not be seasonally restricted) and will not be restricted to daylight hours, however deployment and retrieval, and maintenance activities will be restricted to daylight hours. Operational procedures will be detailed in Risk Assessment Method Statements (RAMS) that will be submitted as supporting documentation to project specific deployments.

Warrior Way will be demarked by up to four navigational marker buoys which will be of standard design. Consultation with MHPA on navigational marking requirements will be undertaken on a project-by-project basis. Buoys will only be deployed when required to demarcate testing activities and will not be deployed for the duration of the site consent.

Vessels used in deployment and retrieval, and operation and maintenance operation may be up to 164 m in length and 6.8 m draught as this is the maximum vessel length and draught that can be supported at Pembroke Port, however the most likely vessel length is 25-30 m. Noise emissions from vessels and operational devices and test will be minimal, and not above background noise levels already occurring in the Milford Haven Waterway.

Table 1.1 below details the proposed maximum and most likely PDE for testing at Warrior Way.

Table 1.1: Warrior Way testing activity characteristics.

Project Detail	Maximum Scenario	Most Likely Scenario
Position in water column	Tidal components are likely to occupy all or part of the water-column.	
Dimensions	25 m x 15 m	5 (L); 5 (W)
Rotor Diameter (tidal only)	≤ 10 m	≤ 5 m
Swept area (tidal only)	78.5 m^2	19.63 m^2
Height above surface	≤ 2 m	minimal/at sea surface
Number of devices/tests that can be supported	1	
Sea area per device/component	≤ 200 m^2	≤ 100 m^2
Seabed footprint per device/component (where devices or component touches the seabed)	Up to 200 m^2	Up to 100 m^2
Speed of moving parts	≤ 5 m/s	≤ 2 m/s
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	5 m strip around device seabed footprint	None required

Project Detail	Maximum Scenario	Most Likely Scenario
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments	
Mooring/attachment method	≤ 4 drag anchors with associated slack lines, catenary mooring system. Gravity base may be required at Warrior Way - maximum area up to 25 m^2. No pin piling will be carried out at Warrior Way	Deployed from vessel or attached to test support buoys
Mooring spread per test	150 m^2	50-75 m^2

Deployment and Retrieval

Table 1.2 presents the proposed PDE for deployment and retrieval of devices at Warrior Way.

Table 1.2: Warrior Way deployment and retrieval PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
No. vessels	≤ 5	≤ 3
Frequency of deployment and retrieval operations in a 12-month period	≤ 20 test deployments and 20 retrieval operations in a 12-month period.	≤ 20 test deployments and 20 retrieval operations in a 12-month period.

Operations and Maintenance

Table 1.3 presents the proposed PDE for Operation and Maintenance activities at Warrior Way.

Table 1.3: Warrior Way operations and maintenance PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
Duration of tow testing activity (estimated % time device in water given in brackets)	3 months (50 %)	≤ 1 month (50 %)
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	3-6 months (100 %)	1-3 months (80 %)
Frequency of O&M visits	≤ 104 vessel visits in a 12-month period	≤ 52 vessel visits in a 12-month period

Project Detail	Maximum Scenario	Most Likely Scenario
No. of vessels	≤ 5	≤ 3

1.3.2 Dale Roads

Overview

The maximum testing scenario at Dale Roads is one test at any one time.

Devices may be attached to developers' own moorings, deployed on the seabed, or deployed from a floating platform, vessel or test support buoy. MEW will provide an ADCP, a Waverider Buoy, and a test support buoy to support testing activities at Dale Roads. Drilled pin piling may be required to support test deployments at Dale Roads, therefore further details of pin piling are provided below in Table 1.4.

Testing may include floating surface structures, surface piercing structures, sub-surface testing and/or seabed mounted structures, and devices may yaw according to local current and tidal conditions, as well as movement of large vessels in proximity to the test site, and therefore may experience up to 360° yaw.

Devices for operational testing at Dale Roads are likely to be towed to site and installed on pre-prepared foundations or attached to META test support buoys.

Communication and power to support the tests proposed will be provided locally at Dale Roads as and when necessary and will not require the installation of any permanent infrastructure to support the testing. Similarly, a test-support buoy capable of dissipating energy at site will be provided at Dale Roads but will not require the installation of any permanent infrastructure.

Operational testing at Dale Roads may be throughout the year (will not be seasonally restricted) and will not be restricted to daylight hours, however deployment and retrieval, and maintenance activities will be restricted to daylight hours. Operational procedures will be detailed in RAMS that will be submitted as supporting documentation to project specific deployments.

Dale Roads will be demarked by up to four navigational marker buoys which will be of standard design. Consultation with MHPA on navigational marking requirements will be undertaken on a project-by-project basis. Buoys will only be deployed when required to demarcate testing activities and will not be deployed for the duration of the site consent.

Vessels used in deployment and retrieval, and operation and maintenance operation may be up to 164 m in length and 6.8 m draught as this is the maximum vessel length and draught that can be supported at Pembroke Port, however most likely vessel length is 25-30 m. Noise emissions from vessels and operational devices and test will be minimal, and not above background noise levels already occurring in the Milford Haven Waterway.

Table 1.4 below details the proposed maximum and most likely PDE for testing at Dale Roads.

Table 1.4: Dale Roads testing activity characteristics

Project Detail	Maximum Scenario	Most Likely Scenario
Position in water column	Wave component testing may occupy a significant proportion of the water column and may include surface-piercing.	
Dimensions	60 m (L) x 40 m (W)	15 m (L) x 10 m (W)
Height above surface	2 m	At sea surface
Number of testing activities	1	
Seabed footprint per device/component (where devices or component touches the seabed)	≤ 2,400 m^2	≤ 200 m^2
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	5 m strip around device seabed footprint	None required
Pin piles	≤ 4 drilled pin piles per device. Each pin pile up to 100 mm diameter installed to a depth of 10 – 20 m.	No pin pilling required
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments.	
Mooring/attachment method	Up to 10 drag anchors with associated slack lines, catenary mooring system. Gravity base may be required at Dale Roads - maximum area up to 500 m^2. Pin piling (drilled) may be required at Dale Roads (see above).	Dynamic tether mooring system or up to 4 standard drag embedment anchors. Gravity base up to 75 m^2. No pin piling.
Mooring spread per test activity	200 x 200 m (40,000 m^2)	50 x 50 m (2,500 m^2)

Pin Piling

The maximum diameter of the pin piles to be installed will be 100 mm. Piles will be drilled only and will be piled to between 10 m and 20 m below the sea bed.

Deployment and Retrieval

Table 1.5 presents the proposed PDE for deployment and retrieval of devices at Dale Roads.

Table 1.5: Dale Roads deployment and retrieval PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
No. of vessels	≤ 5	≤ 3
Frequency of deployment and retrieval operations in a 12-month period, per site	≤ 20 test deployments and 20 retrieval operations in a 12-month period.	≤ 20 test deployments and 20 retrieval operations in a 12-month period.

Operations and Maintenance

Table 1.6 presents the proposed PDE for Operation and Maintenance activities at Dale Roads.

Table 1.6: Dale Roads operations and maintenance PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
Duration of tow testing activity (estimated % time device in water given in brackets)	3 months (50 %)	≤ 1 month (50 %)
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	3-12 months (100 %)	6-12 months (80 %)
Frequency of O&M visits	104 vessel visits in a 12-month period	1 visit weekly
No. of vessels	≤ 5	≤ 3

1.3.3 East Pickard Bay

Overview

East Pickard Bay may support testing of more than one activity or device at any one time. The maximum testing scenario at East Pickard Bay is up to two testing activities/device deployments at any one time. The most likely testing scenario is single activity/device deployment testing at any one time.

Devices may be attached to developers' own moorings, deployed on the seabed, or deployed from a floating platform or vessel.

Ongoing resource monitoring will be undertaken at the site using ADCPs and Waverider Buoys. Relevant consents and permissions for these deployments will be secured separately. A test support buoy capable of dissipating energy, enabling communications and/or localised power at site may be deployed at East Pickard Bay for some periods but will not require the installation of any long-term infrastructure. Pin piling may be required at East Pickard Bay therefore details of the installation process for pin-piling is outlined after Table 1.7.

Testing may include floating surface structures, surface piercing structures, sub-surface testing and/or seabed mounted structures, and devices may yaw according to local current and tidal conditions and therefore may experience up to 360° yaw.

Devices for operational testing at East Pickard Bay are likely to be towed to site and installed on pre-prepared foundations or attached to the test support buoys. Vessels used in installation and retrieval operations will be up to 200 m in length and 8 m draught as this is the maximum vessel length and draught that can be supported at local ports. Noise emissions from vessels and operational devices and test will be minimal, and not above background noise levels already occurring in the Waterway.

Operational testing at East Pickard Bay may be throughout the year (will not be seasonally restricted) and will not be restricted to daylight hours, however installation, deployment and retrieval, and maintenance activities will be restricted to daylight hours. Operational procedures will be detailed in RAMS that will be submitted as supporting documentation to project specific deployments.

East Pickard Bay will be demarked by up to four navigational marker buoys. Advice will be sought from the MCA with regards to navigational marking requirements for the East Pickard Bay site.

Table 1.7: East Pickard Bay testing activity characteristics.

Project Detail	Maximum Scenario	Most Likely Scenario
Position in water column	Wave device testing may occupy a significant proportion of the water column and may include surface-piercing, at surface and sub-surface components.	
Dimensions	147 m (L) x 230 m (W)	80 m (L) x 17 m (W)
Height above surface	≤ 5 m	Minimal/at sea surface
Number of devices	2	1
Seabed footprint per device/component (where devices or component touches the seabed)	Up to 8,000 m^2	1,700 m^2
Seabed footprint (where devices or component touches the seabed) for multiple activity testing	10,250 m^2	3,400 m^2

Project Detail	Maximum Scenario	Most Likely Scenario
Sea surface area required for testing (m^2)	360,000 m^2	100 m^2
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	10 m strip around device seabed footprint.	None required
Pin piles	Up to 4 drilled pin piles per device. Each pin pile up to 100 mm diameter installed to a depth of 10 – 20 m.	No pin pilling required
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments	
Mooring/Attachment method	Up to 3-point catenary mooring system (120° separation) or up to 10 standard drag embedment anchors. Gravity base may be required at East Pickard Bay - maximum area up to 1125 m^2. Pin piling may be required at East Pickard Bay (see above details below).	• Dynamic tether mooring system. • Up to 4 standard drag embedment anchors. • Gravity base up to 1125 m^2. • No pin piling.
Mooring spread per test activity[1]	500 m x 500 m (250,000 m^2)	25 x 25 m (625 m^2)
Total mooring spread for multiple testing activities	500,000 m^2	50,000 m^2

Pin piling

The maximum diameter of the pin piles to be installed will be 100 mm. Piles will be drilled only and will be piled to between 10 m and 20 m below the sea bed.

Rock ballasting

Rock ballasting maybe required for scour protection/moorings of devices in the East Pickard Bay Site. Rocks will be contained in bags and will be removed at the end of the testing period, unless leaving in situ is preferred. Each rock bag will contain up to 5 tonnes of rock and may have a

[1] Maximum mooring spread is provided; however, this allows for up to 6 moorings within the larger area and each mooring itself may be a small area of the total mooring spread area.

diameter of up to 2 m. For the most likely scenario (dimensions) this would equate to 100 rock bags which is equivalent to 500 tonnes. It would take up to 5 days to deploy this volume of rock.

Deployment and Retrieval

Table 1.8 presents the proposed PDE for deployment and retrieval of devices at East Pickard Bay.

Table 1.8: East Pickard Bay deployment and retrieval PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
No. of vessels	≤ 5	≤ 3
Frequency of deployment and retrieval operations in a 12-month period	≤ 20 test deployments and 20 retrieval operations in a 12-month period.	≤ 20 test deployments and 20 retrieval operations in a 12-month period.
Mooring spread if required for deployment and retrieval[1]	400 m x 300 m (120,000 m^2)	350 m x 200 m (70,000 m^2)

Vessels used will have a maximum length of 200 m, and a maximum draught of 8 m. This is dictated by the maximum vessel length and draught that can be supported at local ports.

Operations and Maintenance

Table 1.9 presents the proposed PDE for Operation and Maintenance activities at the East Pickard Bay site.

Table 1.9: East Pickard Bay operations and maintenance PDE.

Project Detail	Maximum Scenario	Most Likely Scenario
Duration of tow testing activity (estimated % time device in water given in brackets)	≤ 3 months (50%)	≤ 1 month (50%)
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	12-18 months (100%)	6-12 months (80%)
Frequency of O&M visits	≤ 150 vessel visits in a 12-month period	≤ 104 vessel visits in a 12-month period
No. of vessels	≤ 5	≤ 3

Vessels used will have a maximum length of 200 m, and a maximum draught of 8 m. This is dictated by the maximum vessel length and draught that can be supported at local ports.

A marine cable corridor between the offshore testing area and MHWS will be included in the offshore consent for East Pickard Bay (site 8). This will accommodate a temporary cable that will

be in situ for up to 18 months and will support the testing of a single marine energy device at East Pickard Bay (mWave). The cable will be removed following testing of the mWave device.

The cable will be run directly to shore from the offshore test area in East Pickard Bay. It will be laid on the seabed (with associated anchoring weights) from the East Pickard Bay offshore test area across the sandy seabed then to shore via a natural channel in the near shore rock seabed. Between MLWS and MHWS, the cable will be laid through rock boulders to meet a semi vertical rock face where the cable will be fixed with the use of rock bolts above the ground surface rock level.

Table 1.10 below details the proposed marine and intertidal cable installation methodology.

Table 1.10: East Pickard Bay marine cabling PDE below MHWS.

Project Detail	Cabling below MHWS
Marine Cabling (below MLWS)	
Installation methodology	Laid on seabed in areas of sandy seabed with clamshell weights to maintain in position. Laid in natural rock channel with clam shell weights in areas of rocky seabed
Cable specification	150 mm diameter reinforced cable
Length of cabling	1.4 km
Duration of installation	Up to 3 days, subject to sea conditions. The cable will be floated ashore and then using divers the floats will be cut so that the cable rests on seabed.
Vessels	Maximum length of 50 m, and a maximum draught of 3 m. Likely to include installation barge, multicat and small work boats
Number of vessels	Up to 4 vessels – including guard boat
Cabling between MLWS and MHWS	
Installation methodology	The cable will be laid through a natural gully. It will be fixed to a semi vertical rock face with rock bolts above the ground surface rock level.
Cable specification	150 mm diameter reinforced cable
Length of cabling	0.045 km
Cable trench width	N/A
Cable trench depth	N/A

Duration of installation works	3 days
Plant requirements	None. Hand tools only
Number of plant	None

2 The Habitat Regulation Assessment Process

2.1 Legislative Context

The Habitats Directive (92/43/EEC), on the conservation of natural habitats and of wild fauna and flora, protects habitats and species of European nature conservation importance. Together with Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive'), the Habitats Directive establishes a network of internationally important sites, designated for their ecological status. SACs are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. Special Protection Areas (SPAs) are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. These sites combine to create a Europe-wide 'Natura 2000' network of designated sites, which are hereafter referred to as 'European sites'.

These Directives are transposed into law in England and Wales by The Conservation of Habitat and Species Regulations 2017 (the Habitats Regulations') for territorial waters of the UK out to 12 nautical miles. SACs and SPAs are protected under the Habitats Regulations.

In addition to sites designated under European legislation, UK Government policy (ODPM Circular 06/2005) states that Internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites) should be offered the same protection. As a matter of policy, the UK Government also affords sites going through the formal designation process i.e. potential SPAs (pSPAs), candidate SACs (cSACs) and and potential (pSACs), Sites of Community Importance (SCIs) and potential Ramsar sites the same level of protection. Commonly, such sites are labelled as 'European sites'.

Under the Habitats Regulations, before granting approval (i.e. planning permissions, licenses and consents) for a development likely to have a significant effect on an SAC or SPA/Ramsar site, an appropriate assessment must be made by the Competent Authority, of the proposed plan or project's potential implications for the site in view of that site's conservation objectives.

There are several regulatory authorities involved in the consenting of the META Project, therefore there is potentially more than one Competent Authority under these Regulations. The Competent Authority for the META Project may be:

- NRW-Marine Licensing Team (NRW-MLT; Marine Licence);
- Marine Management Organisation (MMO; S. 36);
- Milford Haven Port Authority (MHPA; Marine Works Licence); and
- Pembrokeshire County Council (PCC; Planning Permission within the Waterway).

Under Regulation 67 (Habitat Regulations 2017), the Appropriate Authority (in this case Welsh Ministers), may issue guidance to competent authorities relating to circumstances where there is more than one competent authority, and relating to when a competent authority may or should adopt the reasoning or conclusions of another competent authority as to whether a plan or projects is likely to have a significant effect on a European Site, or whether it will adversely affect the integrity of a European Site. The competent authorities concerned must have regard to any such guidance, and they must have regard to the views of the other competent authority/authorities involved.

2.2 The Process

Regulation 63 of the Habitats Regulations (2017) requires that, wherever a plan or project that is not directly connected to, or necessary for, the management of a Natura 2000 site is likely to have a significant effect on the conservation objectives of the site (directly, indirectly, alone or in-combination with other plans or projects), an 'Appropriate Assessment' of the implications of the plan or project must be undertaken by the competent authority before consent or authorisation can be given for the plan or project.

Regulation 63 further makes clear that in light of the conclusions of such an appropriate assessment, the competent authority may agree to the plan or project only after it has determined that it will not adversely affect the integrity of the European site. If an appropriate assessment, however, concludes that the development will adversely affect the integrity of the site (despite any proposed avoidance or mitigation measures or if uncertainty remains), Regulation 64 makes clear that consent/authorisation can only then be given if there are no alternative solutions and that the project must be carried out for Imperative Reasons of Overriding Public Interest (IROPI). Where the site supports priority natural habitats or species, the IROPI must be in relation to reasons i) relating to human health, public safety or beneficial consequences of primary importance to the environment, or ii) other reason which the competent authority considers to be IROPI. Agreement under these circumstances must be accompanied by the securing of necessary compensatory measures to ensure that the overall coherence of the network of European sites is protected.

Regulation 63 further makes it clear that the person applying for the authorisation of the plan or project must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable them to determine whether an appropriate assessment is required. This document provides such information.

This HRA Screening provides information on the methodology followed in carrying out the HRA Stage 1: Screening for the META Project in relation to Natura 2000 and Ramsar sites. In so far as there may be in combination effects on designated sites associated with the META Project these must be considered together with other relevant projects and plans.

The Planning Inspectorate (PINS) Advice Note Ten 'Habitat Regulations Assessment relevant to nationally significant infrastructure projects' (version 8, November 2017), defines HRA as a multi-stage process which helps determines LSE and (where appropriate) assesses adverse impact on the integrity of a European site, examines alternative solutions, and provides justification of IROPI. Whilst it is recognised that the META Project does not constitute a nationally significant infrastructure project, the PINS Advise Note Ten is useful in guiding the META Project HRA process. European guidance describes a four-stage process to HRA, as summarised in Figure 2.1.

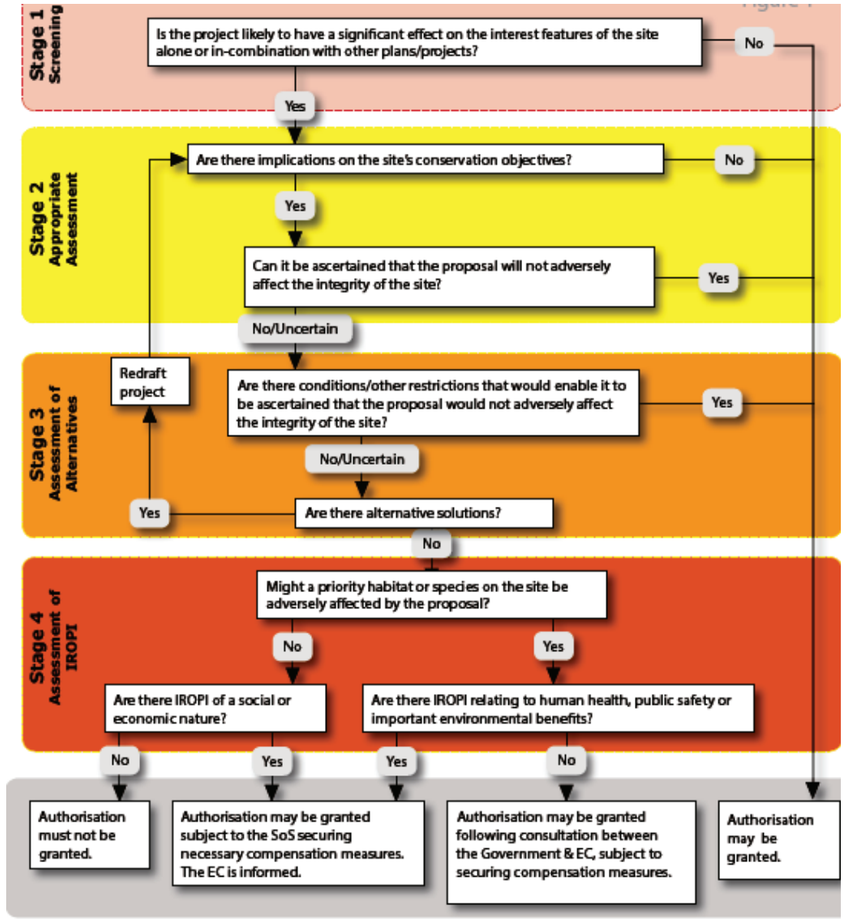

Figure 2-1: Summary of HRA process in accordance with European Guidance (Planning Inspectorate 2017).

All four stages of the process are referred to as the HRA to clearly distinguish the whole process from the one step within it referred to as the "Appropriate Assessment".

The integrity of a site is defined as the coherence of the site's ecological structure and function, across the whole of its area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated (EC, 2001). An adverse effect on integrity is likely to be one which prevents the site from making the same contribution to favourable conservation status as it did at the time of designation.

In accordance to the Planning Inspectorate guidance note ten, there are four steps to the carrying out this HRA Screening and Report to Inform Appropriate Assessment (RIAA):

- Step 1 - Qualifying Interest features - Provide information on identified Natura 2000 and Ramsar sites and their conservation objectives;
- Step 2 - Likely Significant Effect - Identify the likely effects of a project upon a Natura 2000 site, either alone or in combination with other projects and plans, and consider whether these effects may be significant. The assessment must show that there will be no

significant effect, and if there is any uncertainty or where it cannot be determined that there is no LSE, an Appropriate Assessment is required;

- Step 3 - Appropriate Assessment: This is the detailed consideration of the potential effects identified during Screening to determine if there is a potential impact on the integrity of the Natura 2000 site. This step should use objective evidence to determine if it can be concluded that there is no potential for an adverse effect on site integrity based on the conservation objectives of the Natura 2000 site; and
- Step 4 - Avoidance and Mitigation - For identified adverse effects, provide suitable mitigation that will ensure that no adverse effect can be concluded.

This report considers Step 1 and Step 2 of this process.

2.3 Process for Identifying European Sites and Features

The criteria used in this first stage of selection takes account of the location of the European sites (including Ramsar sites) in relation to the META Project, the zone of influence (ZOI) of potential impacts associated with the META Project, and the ecology and distribution of qualifying interest features. These criteria are described in Table 2.1.

Table 2.1: Criteria used for initial identification of relevant European Sites.

Order of Consideration	Criteria used for initial identification of relevant European Sites
1	META Phase 2 site boundaries overlap with European site.
2	European or Ramsar site supports mobile populations of qualifying interest features (e.g. Annex I birds, Annex II marine mammals, migratory fish, bats and otters) that may interact with potential effects associated with the META Project.
3	European site with qualifying features/species whose mean maximum foraging or migratory range overlaps with the META Project.
4	European sites and/or qualifying interest features located within the potential ZOI of impacts associated with the META Project (e.g. habitat loss/disturbance, noise and risk of collision).

This initial screening will exclude sites where the META Project is considered to have no potential for LSE. Sites not excluded at this stage are taken forward for a detailed determination of LSE in Section 3.

3 Identification of European Sites and Features

The following section provides a list of sites (and their features) for which there is potentially connectivity with the META Project, using the criteria in Table 2.1.

3.1 Sites designated for Annex I habitats (subtidal and coastal)

At this stage, it is assumed there is potential for a LSE on any European site which includes Annex I habitats where any part of the META Project falls within the site boundary. Further assessment for determination of LSE will be undertaken in Section 4.2.1 of this report.

For sites designated for relevant Annex I habitats, there may also be potential for indirect effects, due to, for example, sediment resuspension associated with device installation. The zone of influence (ZOI) for assessment of indirect effects has been based on the extent of one tidal excursion. The CCW (2009) Advice in Fulfilment of Regulation 33 of the Conservation (Natural Habitats, &c.) Regulations 1994, states that the tidal excursion up the Waterway is 8 to 10 km on mean spring tides and 4 to 5 km on mean neap tides. Therefore, a precautionary buffer of 10 km has been adopted to ensure that all sites potentially affected by changes in water quality (e.g. increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the assessment. Table 3.1 shows the European sites designated for Annex I habitats (subsea and coastal) that overlap with the offshore components of the META Project and associated 10 km buffer. These are illustrated in Figure 3.1.

Table 3.1: European sites designated for Annex I habitats (subtidal and coastal) for which a LSE cannot currently be discounted.

European site	Relevant Annex I features	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Pembrokeshire Marine/Sir Benfro Forol SAC[1]	Estuaries Large shallow inlets and bays Reefs Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Coastal lagoons (**Priority feature*) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Submerged or partially submerged sea caves	0	0	0
Limestone Coast of South West Wales SAC/Arfordir Calchfaen de Orllewin Cymru	Submerged or partially submerged sea caves	10	6.5	2

[1] The migratory fish and marine mammals which are also qualifying features of this site are covered in Table 3.2 and Table 3.3.

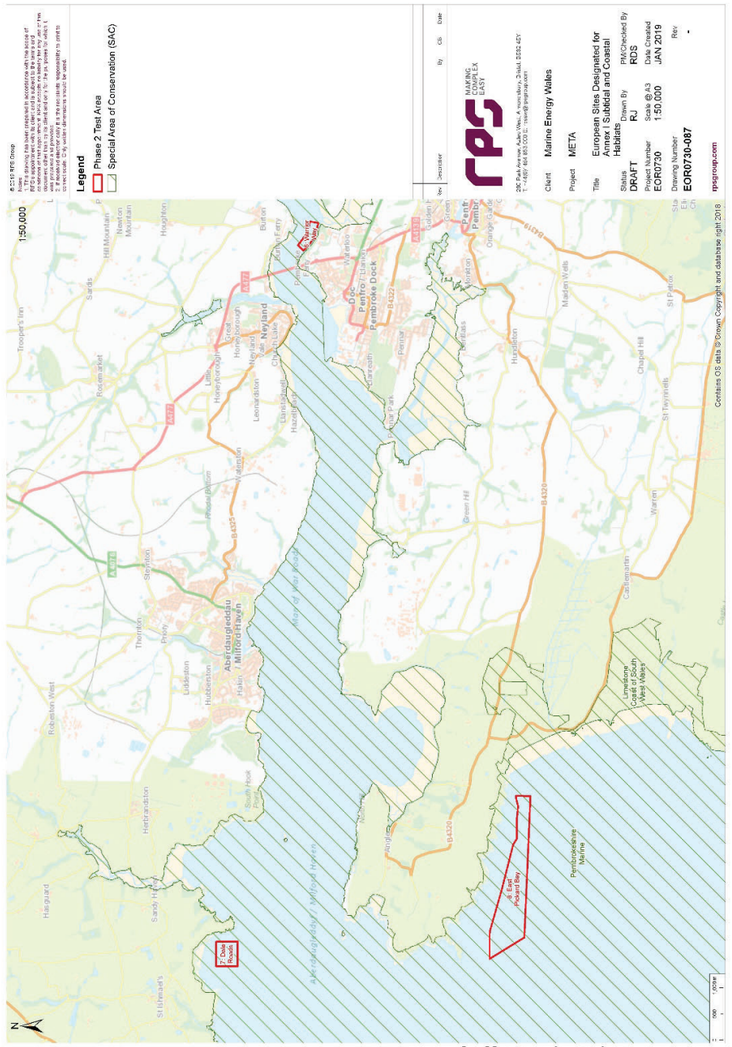

Figure 3-1: European sites designated for Annex I habitats (subtidal and coastal) for which a LSE cannot currently be discounted.

3.2 Sites designated for Annex II diadromous migratory fish

Annex II diadromous fish species which are features of SACs in the UK are:

- Twaite shad *Alosa fallax*;
- Allis shad *Alosa alosa*;
- Atlantic salmon *Salmo salar*;
- Sea lamprey *Petromyzon marinus*; and
- River lamprey *Lampetra fluviatilis*.

At this stage, it is assumed there is potential for a LSE on any European site which includes Annex II diadromous fish species, where any part of the META Project falls within the site boundary, and further assessment for determination of LSE will be undertaken in Section 4.2.2 of this report. There may however, also be potential for the META Project to result in impacts on Annex II diadromous species at some distance from the sites where they are qualifying interest features on the basis that these species are mobile and utilise both freshwater and marine/offshore environments throughout their life cycle.

Taking a precautionary approach, it has been considered that European sites with Annex II diadromous fish notified interest features which are located within 50 km from the META Project could potentially be affected by the META Project.

The European sites designated for Annex II diadromous fish species which have been identified are listed in Table 3.2 and shown in Figure 3.2. These sites will be assessed for LSE in Section 4.2.2.

Table 3.2: European sites designated for Annex II diadromous fish species for which a LSE cannot currently be discounted.

European site	Relevant Annex II features	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Pembrokeshire Marine/ Sir Benfro Forol SAC[1]	Twaite shad *Alosa fallax* Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa*	0	0	0
Afonydd Cleddau/ Cleddau Rivers SAC[2]	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*	11	16	17
Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC[3]	Twaite shad *Alosa fallax* Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa*	15.5	29	26

[1] The subtidal/ coastal habitats and marine mammal species which are also qualifying features of this site are covered in Table 3.1, Table 3.3 respectively.

[2] Otters which are also qualifying features of this sites are covered in Table 3.3.

[3] All other features of this SAC have been screened out at the initial site selection stage as they are not within the respective ZoI.

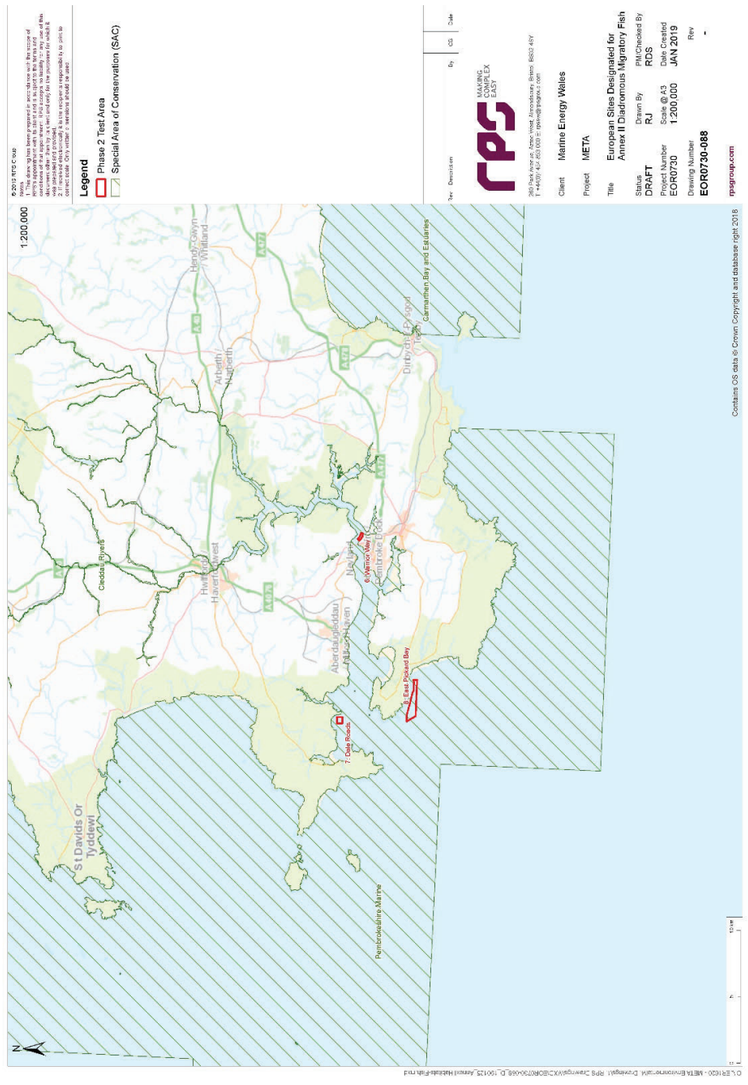

Figure 3-2: European sites designated for Annex II diadromous fish species for which a LSE cannot currently be discounted.

3.3 Sites designated for Annex II marine mammals

At this initial stage, it is assumed there is potential for a LSE on any European site which includes Annex II marine mammals, where any part of the META Project falls within the site boundary, and further assessment for determination of LSE will be undertaken in Section 4.2.3 of this report. However, given that marine mammals are mobile species which potentially forage over wide areas, they could potentially be affected by activities that occur at some distance from the sites where they are qualifying interest features. A precautionary approach has therefore been adopted, and it has been considered that European sites with Annex II marine mammal features which are located within 100 km from the META Project could potentially be affected by the META Project. The European sites designated for Annex II marine mammals which have been identified are listed in Table 3.3 and shown in Figure 3.3. These sites will be assessed for LSE in Section 4.2.3.

As noted in Table 3.3, otter *Lutra lutra* have been included within marine mammals for potential impacts to this species when in the marine environment. Although otter is a feature of the Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC they have been scoped out at this initial stage based on the distance of the site from the META Project (i.e. >91 km) and taking into account that otter generally have a maximum foraging range of up to 54 km for males and 24 km for females (Durbin, 1996).

Table 3.3: European sites designated for Annex II marine mammals for which a LSE cannot currently be discounted.

European site	Relevant Annex II features	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Pembrokeshire Marine/ Sir Benfro Forol SAC[1]	Grey seal *Halichoerus grypus* Otter *Lutra lutra*	0	0	0
West Wales Marine/Gorllewin Cymru Forol cSAC	Harbour porpoise *Phocoena phocoena*	13	0	0
Cleddau Rivers/ Afonydd Cleddau SAC[2]	Otter *Lutra lutra*	11	16	17
Bristol Channel Approaches cSAC/ Dynesfeydd Môr Hafren MPA	Harbour porpoise *Phocoena phocoena*	19	7	15
Cardigan Bay/ Bae Ceredigion SAC[3]	Bottlenose dolphin *Tursiops truncatus* Grey seal *Halichoerus grypus*	43	47	50.5
Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC[3]	Bottlenose dolphin *Tursiops truncatus*	91	98	102

[1] The subtidal/ coastal habitats and migratory fish species which are also qualifying features of this sites are covered in Table 3.1 and Table 3.2 respectively.

[2] The migratory fish species and otters, which are also qualifying features of this sites, are covered in Table 3.2 and Table 3.3 respectively. All terrestrial habitats and species have been screened out of further assessment on the basis of no receptor-impact pathway.

[3] All other qualifying features of this SAC have been screened out of further assessment on the basis that they are outside the ZoI and there will therefore be no receptor-impact pathway.

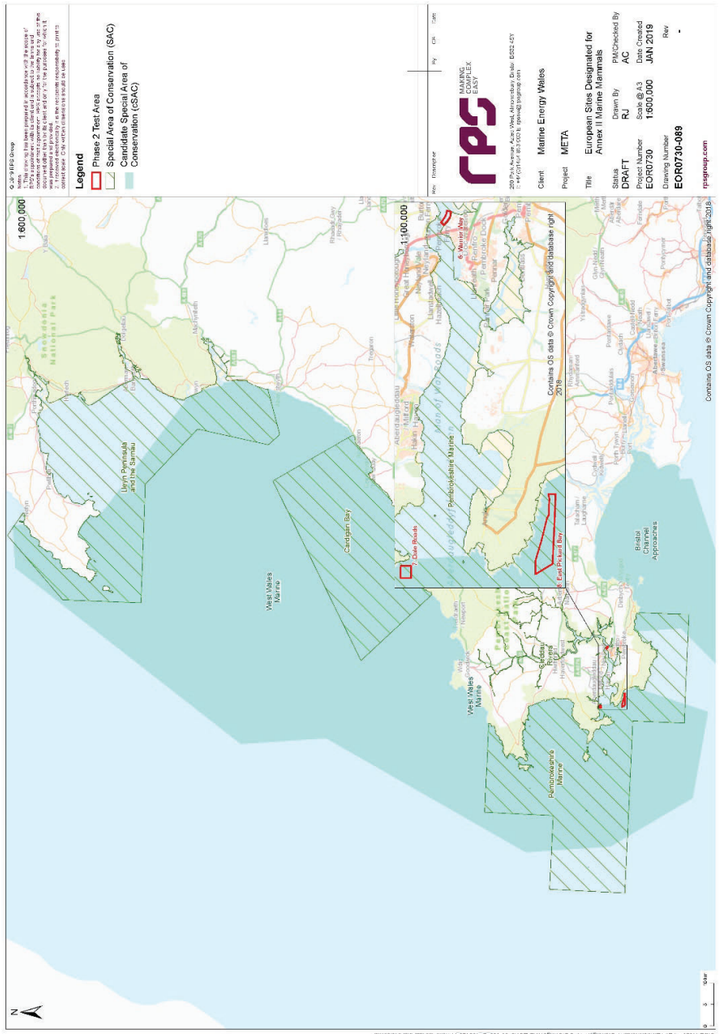

Figure 3-3: European sites designated for Annex II marine mammals for which LSE cannot currently be discounted.

3.4 Sites designated for marine ornithological features

At this initial stage, it is assumed there is potential for a LSE on any European site which includes seabirds as a qualifying interest feature, where any part of the META Project falls within the site boundary, and further assessment for determination of LSE will be undertaken in Section 4.2.4 of this report.

Given, however, that birds are highly mobile species which potentially forage over wide areas, they could potentially be affected by activities that occur at some distance from the sites where they are qualifying interest features. A precautionary approach has therefore been adopted, and it has been considered that European sites with birds as features which are located within 400 km from the META Project could potentially be affected by the META Project. This ZoI has been defined by the mean-maximum foraging distances of bird species likely to be found at the META Project sites and listed as qualifying interest features of designated sites. The outer limit of the study area has been defined by that of the mean-maximum foraging range (Thaxter *et al*., 2012; Soanes *et. al*., 2018) of the northern fulmar, *Fulmaris glacialis*, which is 400 km from its colony (Thaxter *et al*., 2012). As such, this ZoI encompasses the foraging ranges of all relevant seabird species.

Any sites designated for purely terrestrial bird species (e.g. chough *Pyrrhocorax pyrrhocorax*) have been screened out of further assessment due to the lack of receptor-impact pathway.

Where sites have a combination of marine and terrestrial bird features and/or waterfowl and wetland birds, any terrestrial and waterfowl/wetland qualifying species have also been screened out of this section (marine ornithology) due to the lack of receptor-impact pathway and are not shown in Table 3.4.

At this initial screening stage, the maximum breeding foraging ranges of qualifying breeding seabird features (as defined in Thaxter *et al*., 2012) have been considered (See Table 3.4) as a primary means of identifying potential connectivity with SPA breeding sites. Seabird species for consideration have been defined following convention as all of the *Sphenisciformes, Procellariiformes* (incl. *Suliformes*), and *Pelecaniformes* (except the darters) and the skuas, gulls, terns, auks and skimmers of the *Charadriiformes* as well as the loons/divers. **Where a site lies outside this range for the relevant species, these species (and where appropriate the site) have been screened out and shaded in grey in Table 3.4.**

Given the lack of available information on relevant winter foraging behaviour and appropriate ranges, available species specific habitat use information has been utilised to inform winter connectivity **and where no appropriate habitat is present, these species (and where appropriate the site) have been screened out and shaded in grey in Table 3.5.** Where references other than Thaxter *et al.* (2012) have been used, these are provided as footnotes to Table 3.4.

The European sites designated for breeding marine bird species which have been identified are listed in Table 3.4 and shown in Figure 3.4. The sites for which the notified interest feature cannot be screened out on the basis of foraging range for further consideration, will be assessed for LSE in Section 4.2.4 and are summarised below:

- Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA;
- Grassholm SPA;
- Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA;
- Irish Sea Front SPA;
- Lambay Island SPA;
- Saltee Islands SPA; and
- Rathlin Island SPA.

Table 3.4: European sites designated for breeding marine bird species for which LSE cannot currently be discounted.

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Skomer, Skokholm and the seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA	Atlantic puffin *Fratercula arctica*	105.4 km	6.5	4.5	8
	European storm petrel *Hydrobates pelagicus*	65 km			
	Lesser black-backed gull *Larus fuscus*	141 km			
	Manx shearwater *Puffinus puffinus*	330 km			
	Razorbill *Alca torda*	48.5 km			
	Common guillemot *Uria aalge*	84.2 km			
	Black-legged kittiwake *Rissa tridactyla*	60 km			
Grassholm SPA	Gannet *Morus bassanus*	229.4 km	36	22	23
Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA	Manx shearwater *Puffinus puffinus*	330 km	116	117	121
Ynys Feurig, Cemlyn Bay and The Skerries SPA	Arctic tern *Sterna paradisaea*	24.2 km	172	173	178
	Common tern *Sterna hirundo*	15.2 km			
	Roseate tern *Sterna dougallii*	16.6 km			
	Sandwich tern *Sterna sandvicensis*	49 km			

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Anglesey Terns/Morwenoliaid Ynys Môn pSPA	Arctic Tern *Sterna paradisaea*	24.2 km	159	161	166
	Common Tern *Sterna hirundo*	15.2 km			
	Roseate Tern *Sterna dougallii*	16.6 km			
	Sandwich Tern *Sterna sandvicensis*	49 km			
Irish Sea Front SPA	Manx shearwater *Puffinus puffinus*	330 km	212	211	216
Isles of Scilly SPA	European storm-petrel *Hydrobates pelagicus*	65 km	214	209	205
	Lesser black-backed gull *Larus fuscus*	141 km			
	Great black-backed gull *Larus marinus*	54 km*			
	Shag *Phalacrocorax aristotelis*	14.5 km			
	Storm petrel *Hydrobates pelagicus*	65 km			
Puffin Island/ Ynys Seiriol SPA	Cormorant *Phalacrocorax carbo*	25 km	189	193	197
Liverpool Bay SPA	Little tern *Sternula albifrons*	6.3 km	185	189	193
	Common tern *Sterna hirundo*	15.2 km			
Mersey Narrows and North Wirral Foreshore SPA	Common tern *Sterna hirundo*	15.2 km	221	227	230
	Cormorant Phalacrocorax carbo	25 km			

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Dee Estuary SPA	Sandwich tern *Sterna sandvicensis*	49 km	212	219	222
	Common tern *Sterna hirundo*	15.2 km			
	Little tern *Sterna albifrons*	6.3 km			
Morecambe Bay and Duddon Estuary SPA	Little tern *Sterna albifrons*	6.3 km	274	279	283
	Sandwich tern *Sterna sandvicensis*	49 km			
	Common tern *Sterna hirundo*	15.2 km			
	Lesser black-backed gull *Larus fuscus* (Concentration)	141 km			
	Lesser black-backed gull *Larus fuscus graellsii* (breeding)	141 km			
	European herring gull *Larus argentatus argenteus*	61.1 km			
Ribble and Alt Estuaries SPA	Common tern *Sterna hirundo*	15.2 km	234	241	244
	Lesser black-backed gull *Larus fuscus graellsii*	141 km			
	Black-headed Gull *Larus ridibundus*	25.5 km			
Ailsa Craig SPA	Gannet *Morus bassanus*	229.4 km	393	391	396

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Lesser black-backed gull *Larus fuscus*	141 km			
	Guillemot *Uria aalge*	84.2 km			
	Kittiwake *Rissa tridactyla*	60 km			
	Herring gull *Larus argentatus*	61.1 km			
Larne Lough SPA	Common tern *Sterna hirundo*	15.2 km	345	343	347
	Roseate tern *Sterna dougallii*	16.6 km			
	Sandwich tern *Sterna sandvicensis*	49 km			
Outer Ards SPA	Arctic tern *Sterna paradisaea*	24.2 km	296	293	298
Strangford Lough SPA	Arctic Tern *Sterna paradisaea*	24.2 km	292	289	294
	Common Tern *Sterna hirundo*	15.2 km			
	Sandwich Tern *Sterna sandvicensis*	49 km			
Carlingford Lough SPA	Common Tern *Sterna hirundo*	15.2 km	271	267	271
	Sandwich Tern *Sterna sandvicensis*	49 km			
Skerries Islands SPA	Cormorant *Phalacrocorax carbo*	24 km	222	216	221
	Shag *Phalacrocorax aristotelis*	14.5 km			
	Herring Gull *Larus argentatus*	61.1 km			
Rockabill SPA	Roseate tern *Sterna dougallii*	16.6 km	223	218	223
	Common tern *Sterna hirundo*	15.2 km			

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Arctic tern *Sterna paradisaea*	24.2 km			
Lambay Island SPA	Fulmar *Fulmarus glacialis*	400 km	211	205	210
	Cormorant *Phalacrocorax carbo*	25 km			
	Shag *Phalacrocorax aristotelis*	14.5 km			
	Lesser Black-backed Gull *Larus fuscus*	141 km			
	Herring Gull *Larus argentatus*	61.1 km			
	Kittiwake *Rissa tridactyla*	60 km			
	Guillemot *Uria aalge*	84.2 km			
	Razorbill *Alca torda*	48.5 km			
	Puffin *Fratercula arctica*	105.4 km			
Ireland's Eye SPA	Cormorant *Phalacrocorax carbo*	25 km	203	198	202
	Herring Gull *Larus argentatus*	61.1 km			
	Kittiwake *Rissa tridactyla*	60 km			
	Guillemot *Uria aalge*	84.2 km			
	Razorbill *Alca torda*	48.5 km			
Howth Head Coast SPA	Kittiwake *Rissa tridactyla*	60 km	199	193	198
	Roseate tern *Sterna dougallii*	16.6 km	196	189	194

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
South Dublin Bay and Rover Tolka Estuary SPA	Common tern *Sterna hirundo*	15.2 km			
	Arctic tern *Sterna paradisaea*	24.2 km			
Dalkey Islands SPA	Roseate tern *Sterna dougallii*	16.6 km	191	185	190
	Common tern *Sterna hirundo*	15.2 km			
	Arctic tern *Sterna paradisaea*	24.2 km			
The Murrough SPA	Little tern *Sterna albifrons*	6.3 km	161	154	159
	Sandwich Tern *Sterna sandvicensis*	49 km			
Wicklow Head SPA	Kittiwake *Rissa tridactyla*	60 km	157	150	155
Wexford Harbour and Slobs SPA	Little tern *Sterna albifrons*	6.3 km	120	108	111
Saltee Islands SPA	Fulmar *Fulmarus glacialis*	400 km	123	110	113
	Gannet *Morus bassanus*	229.4 km			
	Cormorant *Phalacrocorax carbo*	25 km			
	Shag *Phalacrocorax aristotelis*	14.5 km			
	Lesser Black-backed Gull *Larus fuscus*	141 km			
	Herring Gull *Larus argentatus*	61.1 km			
	Kittiwake *Rissa tridactyla*	60 km			

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Guillemot *Uria aalge*	84.2 km			
	Razorbill *Alca torda*	48.5 km			
	Puffin *Fratercula arctica*	105.4 km			
Keeragh Islands SPA	Cormorant *Phalacrocorax carbo*	25 km	136	123	125
Mid-Waterford Coast SPA	Cormorant *Phalacrocorax carbo*	25 km	162	148	150
	Herring Gull *Larus argentatus*	61.1 km			
Helvick Head to Ballyquin SPA	Cormorant *Phalacrocorax carbo*	25 km	183	170	171
	Herring Gull *Larus argentatus*	61.1 km			
	Kittiwake *Rissa tridactyla*	60 km			
Cork Harbour SPA	Common Tern *Sterna hirundo*	15.2 km	224	211	211
Sovereign Islands SPA	Cormorant *Phalacrocorax carbo*	25 km	244	230	230
Old Head of Kinsale SPA	Kittiwake *Rissa tridactyla*	60 km	250	237	237
	Guillemot *Uria aalge*	84.2 km			
Rathlin Island SPA	Guillemot *Uria aalge*	84.2 km	405	400	404
	Razorbill *Alca torda*	48.5 km			
	Kittiwake *Rissa tridactyla*	60 km			

European site	Relevant qualifying breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range for relevant season (where available) based on Thaxter *et al.* (2012)	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Puffin *Fratercula arctica*	105.4 km			
	Herring gull *Larus argentatus*,	61.1 km			
	Lesser black-backed gull *Larus fuscus*	141 km			
	Common gull *Larus canus*	50 km			
	Fulmar *Fulmarus glacialis*,	400 km			

* Source: Maynard and Ronconi (2018).

Table 3.5: European sites designated for non-breeding marine bird species for which LSE has been discounted due to lack of appropriate supporting habitat.

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Carmarthen Bay/Bae Caerfyrddin SPA	Common scoter *Melanitta nigra (Winter)*	No data. Birds restricted to low disturbance suitable foraging habitat in winter (shallow <20 m sandy substrate). Unlikely to be connected.	15.5	29	26
Northern Cardigan Bay/Gogledd Bae Ceredigion pSPA	Red-throated diver *Gavia stellata (Winter)*	N/A Winter habitats include sheltered inshore waters, sandy bays and sandbanks offshore, as well as tidal rips and fronts. They forage where water depth is less than 30 m. Winter home ranges vary significantly but can be very large (Dierschke *et al.*, 2017; LPO, 2018). They are sensitive to disturbance and avoid human activity. As such they are considered unlikely to be connected based on habitat and the existing levels of disturbance.	88	94	98
Liverpool Bay SPA	Red-throated diver *Gavia stellata*	N/A See above. Unlikely to be connected based on habitat and the existing levels of disturbance.	185	189	193
	Little gull *Hydrocoloeus minutus* (Winter)	No data.			
	Common scoter *Melanitta nigra* (Winter)	No data. Birds restricted to low disturbance suitable foraging habitat in winter (Shallow <20 m sandy substrate). Unlikely to be connected.			

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Mersey Narrows and North Wirral Foreshore SPA	Little gull *Hydrocoloeus minutus (Winter)*	No data	221	227	230
Morecambe Bay and Duddon Estuary SPA	Mediterranean gull *Larus melancephalus* (Winter)	70 km (Poot, 2003; Meininger *et al.*, 1991).	274	279	283
Solway Firth pSPA	Common Scoter *Melanitta nigra* (Winter)	No data. Birds restricted to low disturbance suitable foraging habitat in winter (shallow <20 m sandy substrate). Unlikely to be connected.	357	359	364
	Red-throated diver *Gavia stellate* (Winter)	See above. Unlikely to be connected based on habitat and the existing levels of disturbance.			
	Black-headed gull *Larus ridibundus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Common gull *Larus canus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Cormorant *Phalacrocorax carbo* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Herring gull *Larus argentatus argenteus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
Dundalk Bay SPA	Black-headed Gull *Chroicocephalus ridibundus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	256	251	255
	Common Gull *Larus canus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Herring Gull *Larus argentatus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
River Nanny Estuary and Shore SPA	Herring Gull *Larus argentatus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	234	228	233
Skerries Islands SPA	Cormorant *Phalacrocorax carbo*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	222	216	221
Lambay Island SPA	Cormorant *Phalacrocorax carbo*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
North Bull Island SPA	Common Gull *Larus canus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	201	194	199
	Black-headed Gull *Chroicocephalus ridibundus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Greater Black-backed Gull *Larus marinus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Herring Gull *Larus argentatus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
South Dublin Bay and Rover Tolka Estuary SPA	Black-headed gull *Chroicocephalus ridibundus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	196	189	194
The Murrough SPA	Black-headed gull *Chroicocephalus ridibundus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	161	154	159
	Red throated Diver *Gavia stellata* (Winter)	See above. Unlikely to be connected based on habitat and the existing levels of disturbance			
	Herring Gull *Larus argentatus* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
Wexford Harbour and Slobs SPA	Cormorant *Phalacrocorax carbo*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	120	108	111
	Black-headed gull *Chroicocephalus ridibundus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Lesser black-backed gull *Larus fuscus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
Ballymacoda Bay SPA	Black-headed Gull *Chroicocephalus ridibundus* (	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	204	191	192
	Common Gull *Larus canus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Lesser Black-backed Gull *Larus fuscus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
Ballycotton Bay SPA	Common Gull *Larus canus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	213	199	200
	Lesser Black-backed Gull *Larus fuscus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
Cork Harbour SPA	Black-headed Gull *Chroicocephalus ridibundus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	224	211	211
	Common Gull *Larus canus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			

European site	Relevant qualifying non-breeding marine bird interest features. Those features shaded in grey are species whose foraging ranges or habitat preferences do not overlap with the META Project and so have been screened out due to lack of receptor-impact pathway.	Mean Max foraging range or known habitat preference	Distance to Warrior Way (km)	Distance to Dale Roads (km)	Distance to East Pickard Bay (km)
	Lesser Black-backed Gull *Larus fuscus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
	Cormorant *Phalacrocorax carbo* (Winter)	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			
Courtmacsherry Bay SPA	Black-headed Gull *Chroicocephalus ridibundus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.	258	245	245
	Great Northern Diver *Gavia immer*	No data			
	Common Gull *Larus canus*	No data. Suitable habitat present but given distance significant connectivity is considered unlikely.			

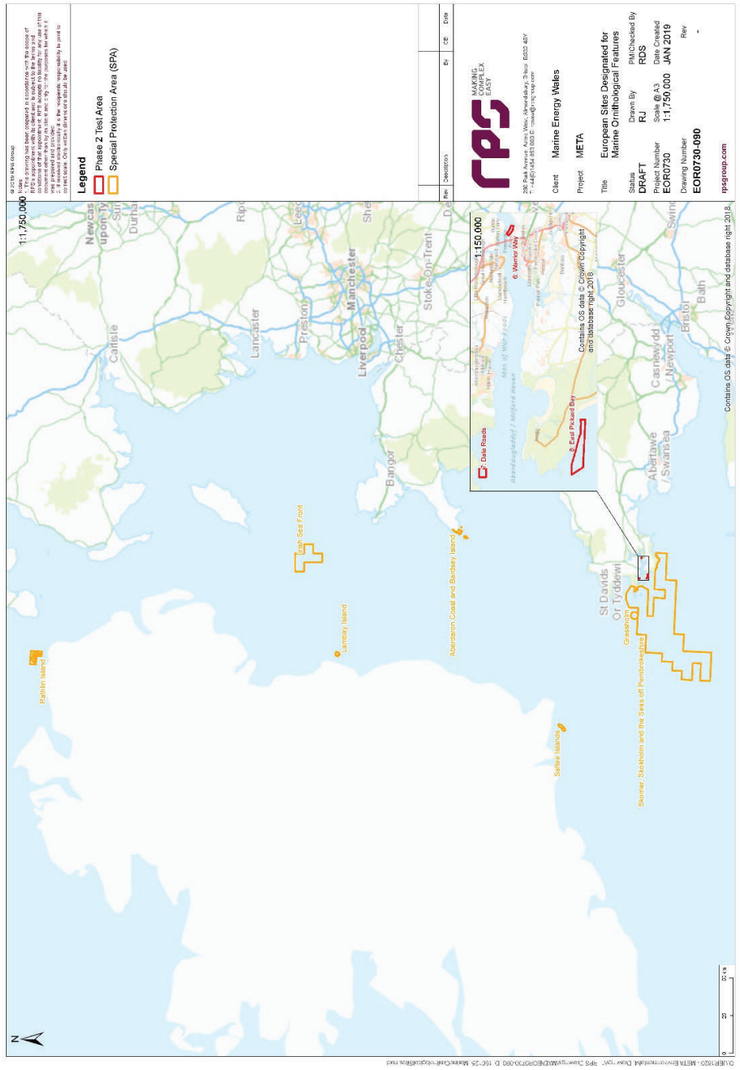

Figure 3-4: European sites designated for marine ornithological features for which a LSE cannot currently be discounted.

3.5 Sites designated for Annex II otters

At this stage, it is assumed there is potential for a LSE on any European site which includes otter *Lutra lutra* as a qualifying feature where any part of the META Project falls within a 10 km buffer. These sites are outlined in Table 3.6 and shown in Figure 3-5. Further assessment for determination of LSE will be undertaken in Section 4.2.3 of this report.

Table 3.6: European sites designated for otters for which a LSE cannot currently be discounted.

European site	Relevant Annex I features	Distance to East Pickard Bay (km)
Pembrokeshire Marine/Sir Benfro Forol SAC[1]	Otter *Lutra lutra*	0.0
Pembrokeshire Bat Sites and Bosherston Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC[2]	Otter	9.1

[1] The subtidal/coastal habitats, migratory fish and marine mammal species, which are also qualifying features of this sites, are covered in Table 3.1, Table 3.2 and Table 3.3 respectively.

[2] All other terrestrial habitats and species have been screened out of further assessment on the basis of no receptor-impact pathway.

3.6 Sites designated for Annex II onshore/coastal ornithological features

At this stage, it is assumed there is potential for a LSE on any European site which includes Annex II onshore ornithological species as qualifying features, where the site boundary is within a 10 km buffer of the META project. These sites are outlined in Table 3.7 and shown in Figure 3-5. Further assessment for determination of LSE will be undertaken in Section 4.2.5 of this report.

There are no SPAs with wildfowl or wader features within 10 km of the META Project and as such no further consideration of such species will be made within this document.

Table 3.7: European sites designated for Annex II onshore ornithological features for which a LSE cannot currently be discounted.

European site	Relevant Annex I features	Distance to East Pickard Bay (km)
Castlemartin Coast SPA	Chough *Pyrrhocorax pyrrhocorax*	1.2

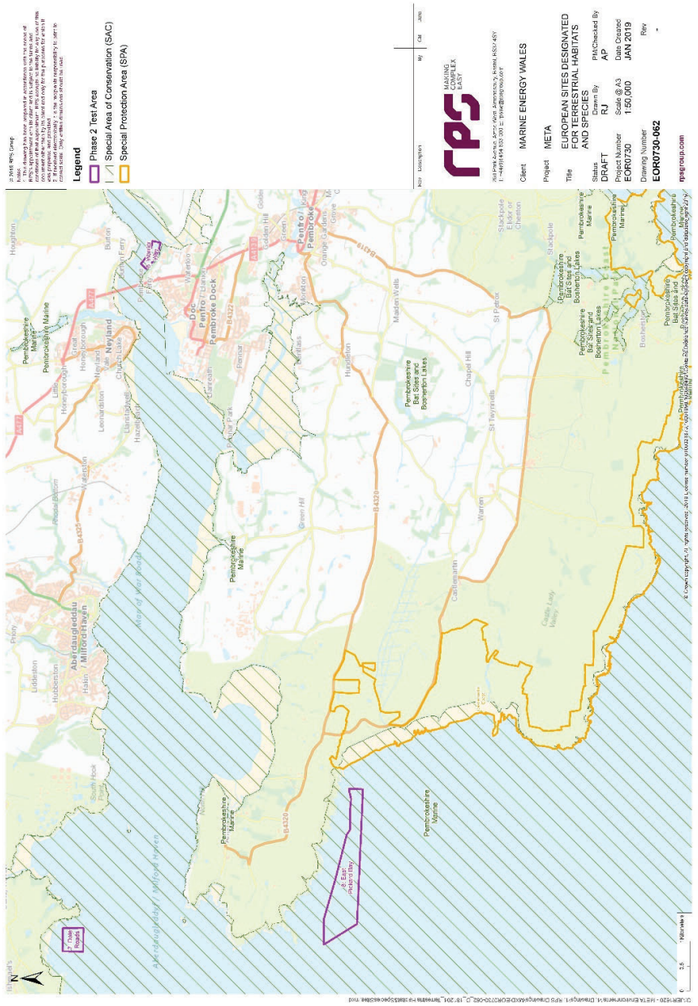

Figure 3-5: European sites designated for terrestrial bird species and otter for which a LSE cannot currently be discounted.

4 Determination of Likely Significant Effect (LSE)

The initial screening documented in Section 3, generated a list of designated sites and qualifying interest features (Table 3.1 to Table 3.7) for which LSE as a result of the META Project cannot be discounted.

This Section documents the assessment of LSE for those European sites which have been screened in to LSE: Stage 1 of the Habitats Regulations Assessment process.

4.1 Methodology

The assessment of LSE is presented in the following sections as a series of matrices which set out the author's expert opinion based on available evidence, on whether no LSE can be concluded. These have been provided for information and with the aim of assisting the competent authority in reaching a conclusion. The matrix approach adopted for this HRA Stage 1 screening is based upon an approach set out within the Planning Inspectorate's Advice Note 10 on HRA (The Planning Inspectorate, 2017; Version 8) relating to Nationally Significant Infrastructure Projects (NSIP). Although the proposal is not an NSIP, the matrix approach used is considered to be useful in defining the extent of impacts from the META Project on identified designated sites' qualifying interest features, in relation to the sites' conservation objectives.

Evidence to assist the competent authority in reaching a conclusion on the potential for LSE is detailed within the descriptions that accompany each of the matrices. This evidence itself draws upon the project description, information presented within the META Project Scoping Report (RPS, 2018), available published data/evidence, and expert judgement of the likely impacts associated with the META Project.

The following matrix key is applicable to matrices presented in the subsequent sections:

- ✓ - 'No Likely significant effect' cannot be concluded
- × – 'No Likely significant effect' can be concluded
- I = Installation
- O = Operation and maintenance
- R = Retrieval

4.2 Assessment of LSE

4.2.1 Annex I habitats (coastal and subtidal)

A description of those European sites with Annex I habitat qualifying interest features identified in Section 3.1 which the META Project has the potential to interact with is provided in the following sections. These comprise:

- Pembrokeshire Marine/ Sir Benfro Forol SAC; and
- Limestone Coast of South West Wales SAC.

Site Overviews

Pembrokeshire Marine/Sir Benfro Forol SAC

Pembrokeshire Marine SAC extends from just north of Abereiddy on the north Pembrokeshire coast to just east of Manorbier in the south, and includes the coast of the islands of Ramsey, Skomer, Grassholm, Skokholm, the Bishops and Clerks and The Smalls (see Figure 3.1).

The Pembrokeshire Marine SAC encompasses areas of sea, coast and estuary that support a wide range of different marine habitats and wildlife, some of which are unique in Wales. Pembrokeshire

Marine SAC is a multiple interest site that has been selected for the presence of eight marine habitat types (NRW, 2017a). For the qualifying habitat features, the Pembrokeshire Marine SAC is considered to be one of the best areas in the UK for:

- Large shallow inlets and bays;
- Estuaries; and
- Reefs

and to support a significant presence of:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Mud-flats and sand-flats not covered by seawater at low tide;
- Coastal lagoons;
- Submerged or partially submerged sea caves; and
- Sandbanks which are slightly covered by seawater all the time.

The features are distributed throughout the SAC with no single feature occupying the entire SAC, and with features overlapping in some locations (NRW, 2017a).

Limestone Coast of South West Wales SAC

The Limestone Coast of South West Wales SAC comprises a series of SSSI's stretching from Castlemartin at the western end of southern Pembrokeshire to the Bishopston Valley on the south-east coast of Gower (see Figure 3.1). The Carboniferous Limestone sea-cliffs include exposed and sheltered elevations, up to 50 m high in places, with numerous caves, arches, crevices and blow-holes.

The site has several terrestrial, coastal and species features, with one marine feature which is distributed throughout the SAC:

- Submerged or partially submerged sea caves.

Determination of LSE

Pembrokeshire Marine/Sir Benfro Forol SAC

Table 4.1 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Pembrokeshire Marine SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.1: Likely significant effects matrix for Annex I habitats of the Pembrokeshire Marine SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Qualifying Interest Features	Temporary habitat disturbance			Increased SSCs and sediment deposition			Resuspension of contaminated sediments			Habitat Loss			Introduction of INNS			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Large shallow inlets and bays	✓a		✓a	✓e		✓e	✓f		✓f		✓g		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Estuaries	✓a		✓a	✓e		✓e	✓f		✓f		✓g		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Reefs	✓b		✓b	✓e		✓e	✓f		✓f		✓h		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Mud-flats and sand-flats not covered by seawater at low tide	×c		×c	✓e		✓e	✓f		✓f		×i		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Coastal lagoons	×d		×d	✓e		✓e	✓f		✓f		×i		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Submerged or partially submerged sea caves	×d		×d	✓e		✓e	✓f		✓f		×i		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Sandbanks which are slightly covered by seawater all the time	×d		×d	✓e		✓e	✓f		✓f		×i		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×d		×d	✓e		✓e	✓f		✓f		×i		✓j	✓k	✓j	✓l	✓l	✓l	✓m	✓m	✓m

a: Temporary habitat disturbance during META installation and retrieval activities - There is the potential for spatial overlap between temporary habitat disturbance arising from META installation and retrieval activities at the Warrior Way and Dale Road sites and the distribution of these Annex I habitats within the Pembrokeshire Marine SAC (Welsh Government (WG), 2018). There is no spatial overlap at the East Pickard Bay site. Therefore, **no potential LSE cannot be concluded** for Annex I 'large shallow inlets and bays' and 'estuaries' features of the Pembrokeshire Marine SAC as a result of temporary habitat disturbance during META installation and retrieval activities.

b: Temporary habitat disturbance during META installation and retrieval activities - There is the potential for spatial overlap between temporary habitat disturbance arising from installation and retrieval activities at the META Project and the distribution of this Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018). Therefore, **no potential LSE cannot be concluded** for Annex I 'reef' feature of the Pembrokeshire Marine SAC as result of temporary habitat disturbance during META installation and retrieval activities.

c: Temporary habitat disturbance during META installation and retrieval activities - There is no spatial overlap between temporary habitat disturbance arising from marine cable installation and removal at the East Pickard Bay site, and the distribution of this Annex I habitat within the Pembrokeshire Marine SAC (WG, 2018). Therefore, it can be determined that there is no LSE for Annex I feature 'mud-flats and sand-flats not covered by seawater at low tide' habitat of the Pembrokeshire Marine SAC as a result of temporary habitat disturbance during cable installation and removal works at East Pickard Bay.

d: Temporary habitat disturbance during META installation and retrieval activities - There is no spatial overlap between temporary habitat disturbance arising from device installation or marine cable installation at the META Project and the distribution of these Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018). The same is true of all retrieval activities associated with the META Project. Therefore, it can be determined that there is *no potential for LSE* for Annex I features 'coastal lagoons', 'submerged or partially submerged sea caves', 'sandbanks which are slightly covered by seawater all the time' or 'Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)' habitats of the Pembrokeshire Marine SAC.

e: Increased SSC and sediment deposition during META installation and retrieval activities - There is the potential for spatial overlap between the distribution of these Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018), and the potential ZoI for increased SSCs and associated deposition (i.e. 10 km; one tidal excursion) resulting from installation and retrieval activities at the META Project. Therefore, **no potential LSE cannot be concluded** for all Annex I habitat features of the Pembrokeshire Marine SAC from increased SSC and sediment deposition during installation and retrieval activities.

f: Resuspension of sediment bound contaminants during META installation and retrieval activities - There is the potential for spatial overlap between the distribution of these Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018), and the potential ZoI for increased SSCs and therefore the resuspension of sediment bound contaminants resulting from installation and retrieval activities at the META Project. Therefore, **no potential LSE cannot be concluded** for all Annex I habitat features of the Pembrokeshire Marine SAC from the resuspension of contaminated sediments.

g: Long-term habitat loss under device/foundation footprint - There is the potential for spatial overlap between long-term habitat loss within the device/foundation footprint on the seabed at the Warrior Way and Dale Road sites and the distribution of these Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018). There is no spatial overlap at the East Pickard Bay site. Therefore, **no potential LSE cannot be concluded** for Annex I 'large shallow inlets and bays' and 'estuaries' features of the Pembrokeshire Marine SAC as a result of long-term habitat loss.

h: Long-term habitat loss under device/foundation footprint - There is the potential for spatial overlap between long-term habitat loss within the device/foundation footprint, and cable footprint at East Pickard Bay, on the seabed at the META Project and the distribution of this Annex I habitats within the Pembrokeshire Marine SAC (WG, 2018). Therefore, **no potential LSE cannot be concluded** for Annex I 'reef' feature of the Pembrokeshire Marine SAC as result of long-term habitat loss.

i: Long-term habitat loss under device/foundation footprint - There is no spatial overlap between long-term habitat loss within the within the device/foundation footprint, and marine cable footprint at East Pickard Bay, on the seabed at the META Project and the distribution of this Annex I habitat within the Pembrokeshire Marine SAC (WG, 2018). Therefore, it can be determined that there is *no potential for LSE* for Annex I 'mud-flats and sand-flats not covered by seawater at low tide', 'coastal lagoons', 'submerged or partially submerged sea caves', 'sandbanks which are slightly covered by seawater all the time' or 'Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)' habitat of the Pembrokeshire Marine SAC as a result of long-term habitat loss.

j: Introduction of invasive non-native species (INNS) during META installation and retrieval activities – Due to the overlap of the Pembrokeshire Marine SAC and the benthic ecology study area, there is the potential for increased vessel traffic during META installation and retrieval activities to result in the introduction of INNS and effects on these Annex I habitats. Therefore**, no potential LSE cannot be concluded** for all Annex I habitat features of the Pembrokeshire Marine SAC from the introduction of INNS during installation and retrieval activities.

k: Introduction of INNS during device operation and maintenance – Due to the overlap of the Pembrokeshire Marine SAC and the benthic ecology study area, there is the potential for increased maintenance vessel traffic to result in the introduction of INNS and for the presence of infrastructure within the water column to facilitate the spread of INNS within the Waterway. Therefore, **no potential LSE cannot be concluded** for all Annex I habitat features of the Pembrokeshire Marine SAC from the introduction of INNS during device operation and maintenance.

l: Accidental release of pollutants – Due to the overlap of the Pembrokeshire Marine SAC and the benthic ecology study area, there is the potential for the accidental release of pollutants into the marine environment during installation, operation and maintenance and retrieval activities to result in toxic effects to Annex I habitats, as a result of accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). Therefore, **no potential LSE cannot be concluded** for all Annex I habitat features of the Pembrokeshire Marine SAC from the accidental release of pollutants across all phases of the META Project.

m: In-combination effects– Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Annex I habitats of the Pembrokeshire Marine SAC as a result of in-combination effects across all phases of the META Project.

Limestone Coast of South West Wales SAC

Table 4.2 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Limestone Coast of South West Wales SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature, they are greyed out.

Table 4.2: Likely significant effects matrix for Annex I habitats of the Limestone Coast of South West Wales SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Temporary habitat disturbance			Increased SSCs and sediment deposition			Resuspension of contaminated sediments			Habitat loss			Introduction of INNS			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Submerged or partially submerged sea caves	×n		×n	✓o		✓o	✓p		✓p		×q		✓r	✓s	✓r	✓t	✓t	✓t	✓u	✓u	✓u

n: Temporary habitat disturbance during META installation and retrieval activities - There will be no spatial overlap between temporary habitat disturbance arising from META installation/ retrieval activities or from marine cable installation/removal at the East Pickard Bay site and the distribution of Annex I sea caves within the Limestone Coast of South West Wales SAC. There is also no spatial overlap with the Warrior Way or Dale Roads sites. Therefore, it can be determined that there is *no potential for LSE* for this Annex I habitat and this aspect is screened out of any further assessment.

o: Increased SSC and sediment deposition during META installation and retrieval activities - There is the potential for spatial overlap between the distribution of this Annex I habitat within the Limestone Coast of South West Wales SAC, and the potential ZoI for increased SSCs and associated deposition (i.e. 10 km; one tidal excursion) resulting from installation and retrieval activities and marine cable installation/removal at the East Pickard Bay site. There is no spatial overlap with the Warrior Way or Dale Roads sites. Therefore, **no potential LSE cannot be concluded** for the Annex I sea cave feature of the Limestone Coast of South West Wales SAC from increased SSC and sediment deposition during installation and retrieval activities.

p: Resuspension of sediment bound contaminants during META installation and retrieval activities - There is the potential for spatial overlap between the distribution of this Annex I habitat within the Limestone Coast of South West Wales SAC, and the potential ZoI for increased SSCs and therefore the resuspension of sediment bound contaminants resulting from installation and retrieval activities at the East Pickard Bay site. There is no spatial overlap with the Warrior Way or Dale Roads sites. Therefore, **no potential LSE cannot be concluded** for the Annex I sea cave feature of the Limestone Coast of South West Wales SAC from the resuspension of contaminated sediments.

q: Long-term habitat loss under device/foundation footprint - There will be no spatial overlap between the device/foundation footprint on the seabed at the East Pickard Bay site and the distribution of Annex I sea caves within the Limestone Coast of South West Wales SAC. There is also no spatial overlap with the Warrior Way or Dale Roads sites. Therefore, it can be determined that there is no potential LSE for this Annex I habitat.

r: Introduction of INNS during META installation and retrieval activities – Due to the overlap of the Limestone Coast of South West Wales SAC and the benthic ecology study area, there is the potential for increased vessel traffic during installation and retrieval activities at the East Pickard Bay site to result in the introduction of INNS and effects on this Annex I habitat. There is no predicted overlap with the Warrior Way or Dale Roads sites. Therefore, **no potential LSE cannot be concluded** for Annex I sea cave features of the Limestone Coast of South West Wales SAC from the introduction of INNS during installation and retrieval activities.

s: Introduction of INNS during device operation and maintenance – Due to the overlap of the Limestone Coast of South West Wales SAC and the benthic ecology study area, there is the potential for increased maintenance vessel traffic to result in the introduction of INNS and for the presence of infrastructure within the water column to facilitate the spread of INNS at the East Pickard Bay site. There is no predicted overlap with the Warrior Way or Dale Roads sites. Therefore, **no potential LSE cannot be concluded** for Annex I sea cave features of the Limestone Coast of South West Wales SAC from the introduction of INNS during device operation and maintenance.

t: Accidental release of pollutants – Due to the overlap of the Limestone Coast of South West Wales SAC and the benthic ecology study area, there is the potential for the accidental release of pollutants into the marine environment across all phases at the East Pickard Bay site to cause toxic effects to this Annex I habitat, as a result of accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). There is no predicted overlap with the Warrior Way or Dale Roads sites. Therefore,

no potential LSE cannot be concluded for the Annex I sea cave feature of the Limestone Coast of South West Wales SAC from the accidental release of pollutants during device installation.

u: In-combination effects – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Annex I habitats of the Limestone Coast of South West Wales SAC as a result of in-combination effects during all phases of the project at the East Pickard Bay site.

4.2.2 Annex II diadromous migratory fish

A description of those European sites with Annex II migratory fish as qualifying interest features, as identified in Section 3.2, with the potential to interact with the offshore elements of the META Project is provided in the following sections. These comprise:

- Pembrokeshire Marine/ Sir Benfro Forol SAC;
- Afonydd Cleddau/ Cleddau Rivers SAC; and
- Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC

Site Overviews

Pembrokeshire Marine/Sir Benfro Forol SAC

Twaite shad and Allis shad are Annex II species present as qualifying interest features, but not primary reasons for the selection of the SAC. Shad migrate through estuaries in March-May on their way to spawning grounds and most adults die after spawning, but a proportion of UK fish are known to repeat spawn: these presumably migrate back to sea immediately after spawning in June-July. Juveniles generally migrate from estuaries between August and October, where they spend some time feeding. Further seaward migration is triggered by falling temperatures in winter, but it is possible that at least a proportion of the juvenile fish overwinter in the estuary. At all stages of their life cycle, shad are pelagic fish, and in estuaries the juveniles predominantly occur in the surface layers of the water column.

Adult river lampreys migrate through the Pembrokeshire Marine SAC to reach the Afonydd Cleddau river on their spawning migration, entering freshwater between October and December. Juvenile river lampreys generally migrate downstream into estuaries and inshore waters in spring, though autumn migrations have also been recorded. Since river lampreys feed and grow in estuaries and inshore waters, it should be assumed that juveniles are present in the Pembrokeshire Marine SAC throughout the year.

Adult sea lampreys migrate through the site between March and June to reach the Afonydd Cleddau. Mature adults enter the estuaries from April onwards and migrate some distance upstream. Juvenile sea lampreys migrate downstream between December and June and spend some time feeding in the estuary and inshore waters before moving offshore in search of larger prey. However, as discussed below for the Cleddau Rivers SAC, no sea lamprey have been recorded in the monitoring of the SAC since 2004 so there is no evidence that the site currently supports sea lamprey.

Afonydd Cleddau/ Cleddau Rivers SAC

The Afonydd Cleddau/ Cleddau Rivers SAC is designated for the Annex II species river lamprey which is a primary reason for the selection of the site. Sea lamprey are also present as a qualifying interest feature. The moderate to low-gradient catchment of the SAC together with the mixture of gravels and silts provides large areas of good river lamprey habitat. Electrofishing data indicates that river lamprey ammocoetes are widespread throughout the SAC, and adult river lampreys are evident during the spawning season (CCW, 2012).

Monitoring of the Cleddau Rivers SAC in 2004 found no evidence of sea lamprey ammocoetes in either optimal or sub-optimal habitat (CCW, 2012). There were also no records of adult migrating sea lamprey held. In the second reporting cycle (2007-2012) no sea lamprey were recorded. There is therefore no evidence to indicate that the Cleddau Rivers SAC currently support sea lamprey.

Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC

Twaite shad are a primary reason for the selection of this SAC and migrate though the waters of Carmarthen Bay and Estuaries SAC to reach spawning sites in the River Tywi. The Taf-Tywi-Gwendraeth estuary is also an important nursery area for juveniles and it is likely that twaite shad feed in the inshore waters of Carmarthen Bay. Allis shad are also a qualifying interest feature of the site.

All shad that spawn in the Afon Tywi SAC must pass through the Carmarthen Bay and Estuaries SAC to spawn, and juvenile fish from this population depend on the estuarine and inshore habitat in the marine SAC both as a migration route and for nursery habitat. Peak abundance of adult fish within the SAC occurs between March and May, just prior to the spawning migration. After spawning, surviving fish can be expected to re-enter the estuary in June and July. Adult fish tend to migrate by day at high tide, utilising deeper channels during migration. Juveniles may be present in the SAC at any time of year, with peaks in spring and autumn corresponding to the inshore migration of older juveniles and the downstream migration of young-of-year fish respectively.

Sea lamprey and river lamprey area also present as a qualifying interest feature of this site. Adult river lampreys migrate through the SAC to reach the River Tywi on their spawning migration, entering freshwater between October and December. Juvenile river lampreys generally migrate downstream into estuaries and inshore waters in spring, though autumn migrations have also been recorded. Since river lampreys feed and grow in estuaries and inshore waters, it should be assumed that juveniles are present in the SAC throughout the year.

Adult sea lampreys migrate through the site between March and June to reach the River Tywi. Mature adults enter the estuaries from April onwards and migrate some distance upstream. Juvenile sea lampreys migrate downstream between December and June and spend some time feeding in the estuary and inshore waters before moving off shore in search of larger prey. Accordingly, various stages of sea lamprey should be assumed to be present all year round.

Determination of LSE

Pembrokeshire Marine/Sir Benfro Forol SAC

Table 4.3 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Pembrokeshire Marine SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature, they are greyed out.

Table 4.3: Likely significant effects matrix for Annex II diadromous fish of the Pembrokeshire Marine SAC I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Temporary habitat disturbance			Increased SSCs			Sediment deposition			Underwater noise			Habitat Loss			Collision risk			EMF emissions			Habitat creation and reef effects			Removal of hard substrate			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Twaite shad	x a		x a	x b		x b	x c		x c	x d	x f			x g		√ h		x a	x i			x j			x k		√ l	√ l		√ m	√ m	
Allis shad	x a		x a	x b		x b	x c		x c	x d	x f			x g		√ h		x a	x i			x j			x k		√ l	√ l		√ m	√ m	
Sea lamprey	x a		x a	x b		x b	x c		x c	x e	x e			x g		√ h		x a	x i			x j			x k		√ l	√ l		√ m	√ m	
River lamprey	x a		x a	x b		x b	x c		x c	x e	x e			x g		√ h		x a	x i			x j			x k		√ l	√ l		√ m	√ m	

a: Temporary habitat disturbance during META installation and retrieval activities – There is no spatial overlap in the proposed installation or retrieval activities and spawning grounds for any of the migratory fish feature of the Pembrokeshire Marine SAC, all of which are upriver in the Cleddau Rivers SAC. There is, however, the potential for temporary habitat disturbance due to device installation/retrieval, use of marine vessels and marine cable laying/removal operations (including anchor placements) to affect, and displace individuals from, habitat used by migratory fish species for feeding and nursery grounds or to affect individuals as they migrate through the site. The area of habitat affected would however be very small in the context of the wider area available in the SAC and activities would only be of short term duration and represent a negligible uplift in the levels of current activity within Milford Haven. Therefore, it can be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Pembrokeshire Marine SAC as a result of temporary habitat disturbance during META installation and retrieval activities.

b: Increased SSC during META installation and retrieval activities – Any levels of increased SSCs generated during installation (e.g. during drilling to install pin piles) and retrieval operations are predicted to be minimal and of short term duration. Plumes of increased SSC are not anticipated and there is therefore no potential for increased SSC to affect spawning grounds for any of the migratory fish feature of the Pembrokeshire Marine SAC, as these are located upriver in the Cleddau Rivers SAC. Any disturbance to migratory fish species as they pass through the site or as they use areas of the site for feeding and nursery grounds will be minimal as any increased SSC levels will be rapidly dispersed. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish from increased SSC.

c: Increased sediment deposition during META installation and retrieval activities – As both shad and lamprey are demersal spawners, laying their eggs on the substrate, they are vulnerable to the potential effects of smothering from sediment deposition. However, the spawning grounds for these species are located in freshwater habitats upriver in the Cleddau Rivers SAC and therefore outside the potential ZoI. Furthermore, smothering effects are not considered to be relevant for adults and juveniles feeding in the Pembrokeshire Marine SAC or using these waters as nursery grounds. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish from sediment deposition.

d: Increased underwater noise during META installation activities – Shad are a Group 4 species according to the latest Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al*., 2014) which means that they have special structures mechanically linking the swim bladder to the ear and are therefore particularly sensitive to sound pressure over a wider frequency range. Impact piling will not be required for the installation of any of the foundations or devices at any of the META Project. Lower levels of underwater noise may however, be generated during the installation phase as a result of drilling to install pin piles at the Dale Roads and East Pickard Bay sites. However, based on the expected sound source pressure of drilled piling (i.e. sound pressure levels lower than expected from miscellaneous small vessels) this is not predicted to result in noise levels which are higher than the current ambient noise levels. Therefore, it can be concluded that there is *no potential for LSE* for Annex II shad features of the Pembrokeshire Marine SAC from underwater noise during installation activities.

e: Increased underwater noise across all phases– Lamprey lack a swim bladder and are therefore likely to be sensitive only to sound particle motion. Although it has been suggested that sound may not be relevant to these species at all (Popper, 2005). It can therefore be concluded that there is *no potential for LSE* for Annex II lamprey features of the Pembrokeshire Marine SAC from underwater noise across any phase of the META Project.

f: Increased underwater noise during device operation – Although as discussed above, shad are particularly sensitive to sound pressure over a wider frequency range, the operation of the marine renewable devices is predicted to result in noise levels lower than ambient noise levels currently within the fish and shellfish study area. Therefore, *no potential for LSE is anticipated* for Annex II

shad features of the Pembrokeshire Marine SAC from underwater noise during operation and maintenance and this aspect is screened out of any further assessment.

g: Long-term habitat loss – As discussed above, the spawning grounds for shad and lamprey are located in freshwater habitats upriver in the Cleddau Rivers SAC and therefore outside the potential overlap with long term habitat loss associated with the foundation/device footprints on the seabed. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish features of the Pembrokeshire Marine SAC from long term habitat loss t.

h: Collision risk with tidal devices during device operation – There is the potential for the presence of scaled tidal testing devices at the Warrior Way site to present a collision risk to migratory fish species as they migrate through Milford Haven to/from upriver spawning sites in the Cleddau River SAC. Therefore, **no potential LSE cannot be concluded** for all Annex II migratory fish features of the Pembrokeshire Marine SAC as a result of collision risk with scaled tidal devices during the operation phase.

i: Electromagnetic field (EMF) effects – The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of migratory fish species. The marine cable at the East Pickard Bay site will provide communication, air and power to support testing at the site and therefore has the potential to emit EMF. The effects of EMF are however predicted to be highly localised to within metres/tens of metres of the cable are not anticipated to result in any barriers to migration through the Pembrokeshire Marine SAC. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish features of the Pembrokeshire Marine SAC from EMF.

j: Habitat creation and reef effects – The introduction of man-made structures on the seabed (e.g. foundations, marine renewable devices) may lead to effects on fish by creating reef habitat. However, the overall footprint compared to the wider SAC will be negligible and migratory fish species are considered unlikely to benefit from such reef effects. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish features of the Pembrokeshire Marine SAC from habitat creation.

k: Habitat removal during retrieval phase – The removal of foundations, devices and rock ballasting for the cable at East Pickard Bay site has the potential to reduce habitat complexity for migratory fish. However, this effect is likely to be negligible for migratory fish which migrate through the SAC to/from spawning grounds upriver in the Cleddau River SAC. Therefore, it can be concluded that there is *no potential for LSE* for migratory fish features of the Pembrokeshire Marine SAC from habitat removal.

l: Accidental release of pollutants during installation/retrieval and operation and maintenance activities – There is the potential for the accidental release of pollutants into the marine environment during installation/retrieval activities, marine cable installation/removal works at the East Pickard Bay site and during device operation and maintenance works (i.e. vessel movements, component replacement etc.) to cause toxic effects to Annex II migratory fish species migrating through/using the SAC. This may result from accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). Therefore, **no potential LSE cannot be concluded** for Annex II migratory fish features of the Pembrokeshire Marine SAC from the accidental release of pollutants during device installation/retrieval and operation and maintenance.

m: In-combination effects during device installation, operation and retrieval – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Annex II migratory fish species of the Pembrokeshire Marine SAC as a result of in-combination effects during the installation, operation and retrieval phases of the project.

Afonydd Cleddau/ Cleddau Rivers SAC

Table 4.4 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Cleddau Rivers SAC. The LSE identified for the migratory fish features of this SAC (i.e. lampreys) are identical for those described for the Pembrokeshire Marine SAC (Table 4.3) due to the likely connectively between the two sites for these species. The text Table 4.4 cross-references to in Table 4.3 provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.4: Likely significant effects matrix for Annex II diadromous fish of the Afonydd Cleddau/Cleddau Rivers SAC (I: Installation; O: Operation and Maintenance; R: Retrieval)*.

European Site Features	Temporary habitat disturbance			Increased SSCs			Sediment deposition			Underwater noise			Habitat Loss			Collision risk			EMF emissions			Habitat creation and reef effects			Removal of hard substrate			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	DI	O	R
Sea lamprey	×a		×a	×b		×b	×c		×c	×e	×e			×g			✓h			×i			×j				×k	✓l	✓l	✓l	✓m	✓m	✓m
River lamprey	×a		×a	×b		×b	×c		×c	×e	×e			×g			✓h			×i			×j				×k	✓l	✓l	✓l	✓m	✓m	✓m

* Note that the referenced footnotes in this table correspond to those in Table 4.3 for the Pembrokeshire Marine SAC.

Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC

Table 4.5 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Carmarthen Bay and Estuaries SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.5: Likely significant effects matrix for Annex II diadromous fish of the Carmarthen Bay and Estuaries SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Temporary habitat disturbance			Increased SSCs			Sediment deposition			Underwater noise			Habitat Loss			Collision risk			EMF emissions			Habitat creation and reef effects			Removal of hard substrate			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Twaite shad	x n		x n	x o		x o	x p		x p	x s		x r	x t			x u			x v			x w			x x			x y			x z		
Allis shad	x n		x n	x o		x o	x p		x p	x s		x r	x t			x u			x v			x w			x x			x y			x z		
Sea lamprey	x n		x n	x o		x o	x p		x p	x r		x r	x t			x u			x v			x w			x x			x y			x z		
River lamprey	x n		x n	x o		x o	x p		x p	x r		x r	x t			x u			x v			x w			x x			x y			x z		

n: Temporary habitat disturbance during device META installation and retrieval activities – There is no spatial overlap in the proposed installation or retrieval activities and spawning grounds for any of the migratory fish features of the SAC. Furthermore, the site is sufficiently distant from the META Project that significant numbers of the species from the Carmarthen Bay and Estuaries SAC are unlikely to be present in/migrating through the areas affected by temporary habitat loss during installation and retrieval activities. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Carmarthen Bay and Estuaries SAC from temporary habitat disturbance during installation and retrieval activities.

o: Increased SSC during device META installation and retrieval activities – Any levels of increased SSCs generated during installation and retrieval operations are not predicted to affect spawning grounds for any of the migratory fish features of the Carmarthen Bay and Estuaries SAC. Furthermore, given the distance of the SAC from the META Project, it is considered unlikely that a significant number of individuals from the SAC will be present in/migrating through the areas affected by increased SSCs resulting from installation and retrieval at the META Project. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Carmarthen Bay and Estuaries SAC from increased SSCs during installation and retrieval activities.

p: Increased sediment deposition during META installation and retrieval activities – Given the distance of the Carmarthen Bay and Estuaries SAC from the META Project, the spawning grounds for the migratory fish features of the SAC are outside the ZoI for sediment deposition resulting from installation and retrieval activities and therefore smothering effects to spawning grounds. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Carmarthen Bay and Estuaries SAC from sediment deposition.

q: Increased underwater noise during installation activities – Given the distance of the Carmarthen Bay and Estuaries SAC from the META Project, significant numbers of migratory shad features of the SAC are unlikely to be present in/migrating through the areas affected by underwater noise from drilling during installation activities. Furthermore, the sounds levels generated during drilling are not anticipated to be higher than current background noise levels. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Carmarthen Bay and Estuaries SAC from underwater noise during installation activities.

r: Increased underwater noise across all phases of the META Project – Significant numbers of lamprey from the SAC are unlikely to be within the areas affected by underwater noise across all phases of the project. Furthermore, lamprey are considered unlikely to be sensitive to underwater noise. It can therefore be concluded that there is *no potential for LSE* for Annex II lamprey features of the Carmarthen Bay and Estuaries SAC from underwater noise across any phase of the META Project.

s: Increased underwater noise during device operation – The operation of marine renewable devices at the META Project is predicted to result in noise levels lower than ambient noise levels currently within the fish and shellfish study area. It can therefore be concluded that there is *no potential for LSE* for Annex II shad features of the Carmarthen Bay and Estuaries SAC from underwater noise during operation and maintenance.

t: Long-term habitat loss – As discussed above, the spawning grounds for shad and lamprey features of the Carmarthen Bay and Estuaries SAC are located outside the potential overlap with long term habitat loss associated with the foundation/device footprints on the seabed. It can therefore be concluded that there is *no potential for LSE* for migratory fish features of the Carmarthen Bay and Estuaries SAC from long term habitat loss.

u: Collision risk during device operation – Although there is the potential for the presence of scaled tidal testing devices to present a collision risk to migratory fish species as they migrate to/from the Carmarthen Bay and Estuaries SAC, they are considered highly unlikely to be present

in significant numbers. Therefore, there is *no potential for LSE* for migratory fish features of the Carmarthen Bay and Estuaries SAC from collision risk and this aspect is screened out of any further assessment.

v: Electromagnetic field (EMF) effects – Potential EMF effects associated with the marine cable at the East Pickard Bay site are predicted to be highly localised to within metres/tens of metres of the cable and are not anticipated to result in any barriers to migration or movement of features of the through the Carmarthen Bay and Estuaries SAC. It can therefore be concluded that there is *no potential for LSE* for migratory fish features of the Carmarthen Bay and Estuaries SAC from EMF.

w: Habitat creation and reef effects – Any reef effects associated with the introduction of foundations and marine renewable devices at the META Project sites will be highly localised and significant numbers of fish from the Carmarthen Bay and Estuaries SAC are unlikely to be present. It can therefore be concluded that there is *no potential for LSE* for migratory fish features of the Carmarthen Bay and Estuaries SAC from habitat creation.

x: Habitat removal during META removal activities – Due to the distance between the META Project and the SAC, any effects associated with the removal of foundations, devices and rock ballasting and the associated reduction in habitat complexity are unlikely to affect migratory fish features of the SAC migrating through the area. It can therefore be concluded that there is *no potential for LSE* for migratory fish features of the Carmarthen Bay and Estuaries SAC from habitat removal.

y: Accidental release of pollutants across all phases of the META Project – Due to the distance between the META Project and the SAC, any accidental release of pollutants into the marine environment during installation/retrieval activities, marine cable installation/removal works at the East Pickard Bay site and during device operation and maintenance works (i.e. vessel movements, component replacement etc.) would be dispersed and diluted to levels which would be undetectable Carmarthen Bay and Estuaries SAC and therefore unlikely to cause toxic effects to Annex II migratory fish species migrating through Milford Haven/using the Haven for nursery/feeding grounds. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish features of the Carmarthen Bay and Estuaries SAC from the accidental release of pollutants during device installation/retrieval and operation and maintenance.

z: In-combination effects – On the basis that all impacts associated with the META Project alone have been screened out of further assessment, it is considered that activities associated with planned projects or other activities in the vicinity of the META Project also don't have the potential to cause *LSE* to Annex II migratory fish species of the Carmarthen Bay and Estuaries SAC as a result of in-combination effects during the installation, operation and retrieval phases of the project. It can therefore be concluded that there is *no potential for LSE* for Annex II migratory fish species.

4.2.3 Annex II marine mammals and otters

A description of those European sites with Annex II marine mammal qualifying interest features identified in Section 3.3 with the potential to interact with the offshore elements of the META Project is provided in the following sections. These comprise:

- Pembrokeshire Marine/ Sir Benfro Forol SAC;
- West Wales Marine/Gorllewin Cymru Forol cSAC;
- Cleddau Rivers/ Afonydd Cleddau SAC;
- Bristol Channel Approaches cSAC/ Dynesfeydd Môr Hafren MPA;
- Cardigan Bay/ Bae Ceredigion SAC;
- Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC; and
- Pembrokeshire Bat Sites and Bosherston Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC.

Site Overviews

Pembrokeshire Marine/Sir Benfro Forol SAC

Pembrokeshire is representative of grey seal colonies in the south-western part of the breeding range in the UK. Based on pup production estimates, the Welsh 'population' forms around 3.3% of the UK or about 2.7% of the European population. The Pembrokeshire coast contains the main colony in Wales and is the most southerly in Europe of any significant size (NRW, 2017a). Grey seals present within the site at any one time do not form a discrete population but are instead centred (in terms of abundance) on the Pembrokeshire coast and are considered part of the SW England and Wales management unit (IAMMWG, 2013). Adults and weaned pups are assumed to feed throughout the site and some are known to make long foraging trips offshore to deeper waters from south through south-west to north-west off the Pembrokeshire coast. Pupping tends to occur at a limited number of favourable sites (towards the south-western end of the SAC).

Otters are widespread on, and close to, the coastline throughout the site, both on the open coast and within the Waterway, particularly within the Daugleddau and Cleddau Rivers.

Cleddau Rivers/ Afonydd Cleddau SAC

The Eastern and Western Cleddau Rivers flow through a largely lowland landscape, eventually joining and flowing into the Waterway. These slow-flowing rivers have a diversity of bank-side habitats, and good water quality ensures good stocks of otter prey species. The otter population on these rivers has shown excellent signs of recovery during the last 10–20 years.

West Wales Marine/Gorllewin Cymru Forol cSAC

The West Wales Marine/Gorllewin Cymru Forol cSAC has been recognised as an area with the top 10% predicted persistent high densities of harbour porpoise in UK waters. The site covers an area of 7,377 km^2, extending into the Llŷn peninsula in North Wales to Pembrokeshire in West Wales (NRW and JNCC, 2015); see Figure 3.3. The area included within the site covers important summer habitat for porpoises, while a part of this site in Cardigan Bay was also identified as important during winter. It is estimated (based on the SCANS-II survey which took place in July 2005) that the site supports approximately 2,506 individuals (95% Confidence Interval: 1410 - 4455) for at least part of the year, as seasonal differences are likely to occur. This represents approximately 9% of the population within the UK part of the Celtic and Irish Sea MU (NRW and JNCC, 2015).

Bristol Channel Approaches cSAC/ Dynesfeydd Môr Hafren MPA

The Bristol Channel Approaches/Dynesfeydd Môr Hafren cSAC has been identified as an important area for harbour porpoise during the winter season, and the northern part in Welsh waters is also an important summer area. These emerged as part of the top 10% persistent high density areas for these seasons within the UK. The site covers an area of 5,851 km^2 and covers much of the north coasts of Cornwall and Devon and stretches across the Bristol Channel Approaches to Carmarthen Bay in Wales (JNCC, 2015). It is estimated (based on the SCANS-II survey which took place in July 2005) that the site supports approximately 2,100 individuals (95% Confidence Interval: 805 – 5,661) for at least part of the year, as seasonal differences are likely to occur, and represents approximately 8% of the population within the UK part of the Celtic and Irish Sea MU.

Cardigan Bay/ Bae Ceredigion SAC

Bottlenose dolphins are seen year-round in Cardigan Bay. The number of individuals increases during the summer months, as does group size, reaching a peak in late September and October when quite large aggregations of more than 60 individuals may be seen. Bottlenose dolphins are reported less frequently and in fewer numbers during the winter months. Aerial surveys in Cardigan Bay in winter 2007 showed a clear preference for the offshore areas of the bay (NRW, 2018).

Calving is known to have taken place within Cardigan Bay and new-born and very young calves have been reported in Cardigan Bay from April to September, suggesting a seasonal pattern to calving. There is a likely preference for more sheltered shallow areas for calving.

Bottlenose dolphins are present in Welsh coastal waters throughout the year. There is a strong peak in numbers in summer and only a few animals are seen between November and April. They are most commonly seen in Cardigan Bay within 10 miles of the coast, and most concentrated within 2 miles near headlands and estuaries, such as New Quay, Aberporth, Mwnt, Cemaes Head and around the Teifi estuary, from April to October, although they are also seen in North Wales and around Pembrokeshire. The dolphins of Cardigan Bay are highly mobile. Surveys in North Wales (particularly from Anglesey eastwards towards Liverpool Bay) have revealed that some individuals spend at least part of the winter in this area (NRW, 2018).

Grey seals present within the site at any one time do not form a discrete population, but are instead centred (in terms of abundance) on Cardigan Bay and are considered part of the SW England and Wales management unit. The south-west Wales 'population' size is also determined from pup counts, and has been estimated at approximately 5,000 individuals. Pup production within the Cardigan Bay site represents a small proportion of the south-west Wales production. Pupping is greatest towards the south-western end of the SAC and takes place throughout the site on open coast in suitable habitat (i.e. physically accessible, remote and/or undisturbed rocky coast beaches, coves and caves) and the high proportion of use of sea-caves by the south-west Wales population is a particularly unusual variation in breeding behaviour. Moulting and resting haul-out sites are scattered along the site. None are used as haul-outs by large numbers of seals, instead they generally haul-out singly or in small groups in undisturbed locations throughout the site

Llyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC

Bottlenose dolphins do not form a discrete site-based population within Pen Llŷn a'r Sarnau SAC but instead should be seen as part of a wider population that ranges across waters of the Irish Sea, and includes the Cardigan Bay SAC. See description above for Cardigan Bay SAC (NRW, 2017b).

Pembrokeshire Bat Sites and Bosherston Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC

Pembrokeshire Bat Sites and Bosherston Lakes Special Area of Conservation supports lakes which are an outstanding shallow marl lake system created at intervals in the late 18th and mid-19th centuries by damming a limestone river valley (JNCC, 2018). The lakes are important for their vegetation, including bristly, delicate, common and fragile stoneworts. The site is especially

important for its population of greater horseshoe bat. Greater and lesser horseshoe bats are among at least ten species of bat utilising the surrounding woodland and swampy lakeside margins as feeding flyways. The SAC comprises important breeding sites and transitory roosts for these two rare bat species. This bat population is considered by NRW to be the same population using this SAC and the Limestone Coast of South and West Wales SAC (DECC, 2014).

The lakes are also notable for their population of otters.

The SAC is also designated for the Annex I habitat 'Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.' which is a primary reason for the selection of this site. However, on the basis that there is no spatial overlap of the onshore components of the META Project with this terrestrial habitat, there is no receptor-impact pathway and this feature is screened out.

Determination of LSE

Pembrokeshire Marine/Sir Benfro Forol SAC

Table 4.6 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Pembrokeshire Marine SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.6: Likely significant effects matrix for Annex II marine mammals of the Pembrokeshire Marine SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

	Vessel noise			Vessel collision risk			Increased anthropogenic noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Grey seal	×a	✓b	×a	×c	✓d	×c	×e			✓f		✓f		✓g			✓h		×i	×i	×i		×j			×k		✓l	✓l	✓l	✓ m	✓ m	✓ m
Otter	×n	✓o	×n	×p	✓q	×p	×r							✓s					×t	×t	×t					×u		✓l	✓l	✓l	✓ m	✓ m	✓ m

a: Disturbance from vessel noise during META installation and retrieval activities – There is the potential for noise, associated with an increase in vessel traffic during installation and retrieval activities, to result in disturbance to grey seal. Although grey seal have been recorded in the Waterway, this has been in low numbers (RPS, 2007) and the areas in the vicinity of the META Project are not anticipated to be of particular importance for grey seal. There are no known pupping/breeding sites within the Waterway. Furthermore, the Warrior Way and Dale Roads sites lie within the Waterway, which is a busy in terms of vessel traffic. Therefore, it can be assumed that any grey seals present in the vicinity of the META Project are tolerant of the existing level of vessel noise and the uplift in installation/retrieval vessels (i.e. up to 20 test deployments and 20 retrieval operations over a 12 month period at each site involving up to five vessels) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of vessel noise during installation and retrieval activities.

b: Disturbance from vessel noise during operation and maintenance activities – As is the case during construction (see (a) above), there is the potential for noise associated with an increase in vessel traffic during operation and maintenance activities, to result in disturbance to grey seal. Although the areas in the vicinity of the META Project are not of particular importance for grey seal, the potential uplift in the number of vessel movements per year at each site (i.e. 150 per year for the East Pickard Bay site, 104 visits per year for Dale Roads and 104 visits per year for Warrior Way) may represent a significant shift in the baseline. Therefore, until the shipping baseline has been developed and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of disturbance from vessel noise during operation and maintenance activities.

c: Vessel collision risk during META installation and retrieval activities – For the reasons outlined above for a), the installation and retrieval vessel movements are considered to represent a minimal uplift on the current level of vessel activity in the Waterway. Furthermore, vessels transiting to/from the META Project will use the existing shipping lanes within the Waterway and during installation and retrieval activities will be travelling/manoeuvring at slow speeds. Any grey seal in the Waterway and the vicinity of the East Pickard Bay site are expected to be tolerant of the existing high levels of vessel traffic and the risk posed by vessel collision. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of vessel collision risk during installation and retrieval activities.

d: Vessel collision risk during operation and maintenance activities – Vessels transiting to/from the META Project will use the existing shipping lanes, will adhere to the speed restrictions within the Waterway and during operation and maintenance activities, are anticipated to be travelling/manoeuvring at slow speeds. However, for the reasons outlined above for b), the potential uplift in vessel traffic during operation and maintenance is greater than during installation/retrieval. Therefore, until the current shipping baseline has been defined and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of vessel collision risk during operation and maintenance activities.

e: Disturbance from installation noise - As discussed in Section 1.3 there may be the requirement for drilling to install pin piles at the Dale Roads and East Pickard Bay sites. However, based on the expected sound source pressure of drilled piling (sound pressure levels lower than expected from miscellaneous small vessels) is considered highly unlikely that drilling will result in injury or significant disturbance to marine mammals (Kongsberg, 2012). It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of noise during installation activities.

f: Increased SSC during device META installation and retrieval activities– Any levels of increased SSCs generated during installation (e.g. during drilling to install pin piles) and retrieval operations are predicted to be of short term duration for each installation and retrieval operation. Significant plumes of increased SSC are not anticipated, however the number of installation and retrieval operations may be up to 20 per year for each site. Therefore, there is the potential for interference with the foraging of grey seals. **No potential LSE cannot be concluded** for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of increased SSC levels during deployment and retrieval activities.

g: Collision risk with tidal turbines – Although as discussed above for a), the number of grey seal predicted in the vicinity of the META Project is low, there is the potential for the presence of tidal testing devices at the Warrior Way site to present a collision risk to grey seal as they forage in the Waterway. **No potential LSE cannot be concluded** for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of collision risk with tidal devices during the operation phase.

h: Entanglement risk - Although as discussed above for a), the number of grey seal predicted in the vicinity of the META Project is low, there is the potential that the presence of slack lines and/or chains attached to floating wave and tidal testing devices could result in entanglement of grey seals foraging in the vicinity of the META Project. **No potential LSE cannot be concluded** for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of entanglement risk during the operation phase.

i: Changes in prey resources - As discussed above for a), the number of grey seal predicted in the vicinity of the META Project is low and the sites are not considered to be important foraging grounds for grey seal. Significant impacts to the fish and shellfish community are not anticipated and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the META Project are not predicted to affect the availably of prey for grey seals. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of any changes to the fish and shellfish community.

j: EMF - The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of migratory fish species. The marine cable at the East Pickard Bay site will provide communication, air and power to support testing at the site and therefore has the potential to emit EMF. However, due to low voltage travelling through the cable, effects are likely to be negligible and any effect would be highly localised to within metres of the cable and is not anticipated to result in any barriers to the movement of grey seal. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of Pembrokeshire Marine SAC from EMF and this aspect is screened out of any further assessment.

k: Disturbance from underwater noise resulting from device operation - Based on available data, only low noise levels are anticipated to be produced during the operation of wave and tidal devices. Given the relatively high levels of baseline noise present within the Waterway resulting from current vessel and industry activity together with the low numbers of grey seals predicted in the vicinity of the META Project, it can be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of underwater noise from operational devices.

l: Accidental release of pollutants across all phases of the META Project – There is the potential for the accidental release of pollutants into the marine environment during installation/retrieval activities, cable installation/removal works at the East Pickard Bay site and during device operation and maintenance works (i.e. vessel movements, component replacement etc.) to cause toxic effects to grey seals and otters foraging within the SAC. This may result from accidental spills or

leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). Therefore, there is **potential for LSE** to Annex II grey seal and otter features of the Pembrokeshire Marine SAC from the accidental release of pollutants during device installation/retrieval and operation and maintenance.

m: In-combination effects – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Annex II grey seal features of the Pembrokeshire Marine SAC as a result of in-combination effects during the installation, operation and retrieval phases of the project.

n: Disturbance from vessel noise during META installation and retrieval activities – As discussed above for grey seal (a), there is the potential for noise, associated with an increase in vessel traffic during installation and retrieval activities, to result in disturbance to otters. Although otter are known to have feeding locations within the Waterway in proximity to the META Project, it can be assumed that any otters present in the vicinity of the META Project are tolerant of the existing levels of vessel traffic and associated noise and the uplift in installation/retrieval vessels (i.e. up to 20 test deployments and 20 retrieval operations over a 12 month period at each site involving up to five vessels) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for Annex II otter features of the Pembrokeshire Marine SAC as a result of vessel noise during installation and retrieval activities.

o: Disturbance from vessel noise during operation and maintenance activities – The potential uplift in the number of vessel movements per year at each site (i.e. 150 per year for the East Pickard Bay site, 104 visits per year for Dale Roads and 104 visits per year for Warrior Way) may represent a significant shift in baseline vessel movements in the study area. Furthermore, at sites such as Warrior Way, vessels may be operating close to the shore and to potential otter feeding habitats. Therefore, until the shipping baseline has been developed and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II otter features of the Pembrokeshire Marine SAC as a result of disturbance from vessel noise during operation and maintenance activities.

p: Vessel collision risk during META installation and retrieval activities – For the reasons outlined above for n), the installation and retrieval vessel movements are considered to represent a minimal uplift on the current level of vessel activity in the Waterway. Furthermore, vessels transiting to/from the META Project will use the existing shipping lanes within the Waterway and during installation and retrieval activities will be travelling/manoeuvring at slow speeds. Any otter in the Waterway and the vicinity of the East Pickard Bay site are expected to be tolerant of the existing high levels of vessel traffic and the risk posed by vessel collision. It can therefore be concluded that there is *no potential for LSE* for Annex II otter features of the Pembrokeshire Marine SAC as a result of vessel collision risk during installation and retrieval activities.

q: Vessel collision risk during operation and maintenance activities – Vessels transiting to/from the META Project will use the existing shipping lanes, will adhere to the speed restrictions within the Waterway and, during operation and maintenance activities are anticipated to be travelling/manoeuvring at slow speeds. However, for the reasons outlined above for o), the potential uplift in vessel traffic during operation and maintenance is greater than during installation/retrieval. Therefore, until the current shipping baseline has been defined and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II otter features of the Pembrokeshire Marine SAC as a result of vessel collision risk during operation and maintenance activities.

r: Disturbance from installation noise - As discussed in Section 1.3, there may be the requirement for drilling to install pin piles at the Dale Roads and East Pickard Bay sites. However, based on the expected sound source pressure of drilled piling (sound pressure levels lower than expected from miscellaneous small vessels) is considered highly unlikely that drilling will result in injury or

significant disturbance to otters. It can therefore be concluded that there is *no potential for LSE* for Annex II otter features of the Pembrokeshire Marine SAC as a result of noise during installation activities.

s: Collision risk with tidal turbines – There is the potential for otter to use coastal feeding grounds in the vicinity of the Warrior Way site and therefore there is the potential for the presence of tidal testing devices at this site to present a collision risk to otter as they forage in the Waterway. Therefore, **no potential LSE cannot be concluded** for Annex II otter features of the Pembrokeshire Marine SAC as a result of collision risk with tidal devices during the operation phase.

t: Changes in prey resources - Significant impacts to important prey items for otters as a result of the META Project are not anticipated and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the META Project are not predicted to affect the availably of prey for otters. It can therefore be concluded that there is *no potential for LSE* for Annex II otter features of the Pembrokeshire Marine SAC as a result of any changes to the fish and shellfish community.

u: Disturbance from underwater noise resulting from device operation - Based on available data, only low noise levels are anticipated to be produced during the operation of wave and tidal devices. Given the relatively high levels of baseline noise present within the Waterway resulting from current vessel and industry activity together with the fact that otters don't spend large amounts of time underwater, it can be concluded that there is *no potential for LSE* for Annex II otter features of the Pembrokeshire Marine SAC as a result of underwater noise from operational devices.

Cleddau Rivers/ Afonydd Cleddau SAC

Table 4.7 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Cleddau Rivers SAC. The LSE identified for the otter feature of this SAC are identical for those described for the Pembrokeshire Marine SAC (Table 4.6) due to the likely connectively between the two sites for this species. The text provided with Table 4.6 provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.7: Likely significant effects matrix for Annex II marine mammals of the Cleddau Rivers SAC (I: Installation; O: Operation and Maintenance; R: Retrieval)*.

European site features	Vessel noise			Vessel collision risk			Installation noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Otter	×n	✓o	×n	×p	✓q	×p	×r							✓s					×t	×t	×t					×u		✓l	✓l	✓l	✓ m	✓ m	✓ m

* Note that the referenced footnotes in this table correspond to those in Table 4.6 for the Pembrokeshire Marine SAC.

West Wales Marine/Gorllewin Cymru Forol cSAC

Table 4.8 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the West Wales Marine cSAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.8: Likely significant effects matrix for Annex II marine mammals of the West Wales Marine/Gorllewin Cymru Forol cSAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European site features	Vessel noise			Vessel collision risk			Installation noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Harbour porpoise	× v	✓w	×v	×x	✓y	×x	×z			✓ aa		✓ aa		✓ ab			✓ ac		× ad	× ad	× ad		× ae			× af		✓ ag	✓ ag	✓ ag	✓ ah	✓ ah	✓ ah

v: Disturbance from vessel noise during META installation and retrieval activities – There is the potential for noise associated with an increase in vessel traffic during installation and retrieval activities to result in disturbance to harbour porpoise (Wisniewska *et al*., 2018). Although there is the potential for harbour porpoise to enter the Waterway, there are no records of this species occurring within the Waterway on the NBN gateway, and therefore the abundance within the Waterway itself is predicted to be extremely low/negligible, with any animals that do occur more likely to be present in the vicinity of the Dale Roads and East Pickard Bay sites. The areas in the vicinity of the project are not anticipated to be particularly important foraging grounds for harbour porpoise. Furthermore, the META Project lie within the Waterway, which is a busy waterway in terms of vessel traffic. Therefore, it can be assumed that any harbour porpoise present in the vicinity of the META Project are tolerant of the existing level of vessel noise and the uplift in installation/retrieval vessels (i.e. up to 20 test deployments and 20 retrieval operations over a 12 month period at each site involving up to five vessels) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of vessel noise during installation and retrieval activities.

w: Disturbance from vessel noise during operation and maintenance activities – As is the case during construction (see (a) above), there is the potential for noise associated with an increase in vessel traffic during operation and maintenance activities, to result in disturbance to harbour porpoise (Wisniewska *et al*., 2018). Although the areas in the vicinity of the META Project are not considered likely to be particularly important for harbour porpoise, the potential uplift in the number of vessel movements per year at each site (i.e. 150 per year for the East Pickard Bay site, 104 visits per year for Dale Roads and 104 visits per year for Warrior Way) may represent a significant shift in the baseline. Therefore, until the shipping baseline has been developed and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of disturbance from vessel noise during operation and maintenance activities.

x: Vessel collision risk during META installation and retrieval activities – For the reasons outlined above for a), the installation and retrieval vessel movements are considered to represent a minimal uplift on the current level of vessel activity in the Waterway. Furthermore, vessels transiting to/from the META Project will use the existing shipping lanes within the Waterway and during installation and retrieval activities will be travelling/manoeuvring at slow speeds. Evidence shows that harbour porpoise tense to avoid areas of dense vessel traffic (Evans, 1994; Herr *et al*., 2005) and therefore any harbour porpoise in the Waterway or the vicinity of the East Pickard Bay site are expected to be tolerant of the existing high levels of vessel traffic and the risk posed by vessel collision. It can therefore be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of the West Wale Marine cSAC as a result of vessel collision risk during installation and retrieval activities.

y: Vessel collision risk during operation and maintenance activities – Vessels transiting to/from the META Project will use the existing shipping lanes, will adhere to the speed restrictions within the Waterway and, during operation and maintenance activities are anticipated to be travelling/manoeuvring at slow speeds. However, for the reasons outlined above for b), the potential uplift in vessel traffic during operation and maintenance is greater than during installation/retrieval. Therefore, until the current shipping baseline has been defined and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of vessel collision risk during operation and maintenance activities.

z: Disturbance from installation noise - As discussed in Section 1.3, there may be the requirement for drilling to install pin piles at the Dale Roads and East Pickard Bay sites. However, based on the expected sound source pressure of drilled piling (sound pressure levels lower than expected from

miscellaneous small vessels) is considered highly unlikely that drilling will result in injury or significant disturbance to marine mammals (Kongsberg, 2012). Furthermore, the areas in the vicinity of the META site are not anticipated to be particularly important foraging grounds for harbour porpoise. It can therefore be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of noise during installation activities.

aa: Increased SSC during device META installation and retrieval activities – Any levels of increased SSCs generated during installation (e.g. during drilling to install pin piles) and retrieval operations are predicted to be of short term duration for each installation and retrieval operation. Significant plumes of increased SSC are not anticipated, however the number of installation and retrieval operations may be up to 20 deployments and retrieval operations per site per year. Therefore there is the potential for interference with the foraging of harbour porpoise. **No potential LSE cannot be concluded** for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of increased SSC levels during installation and retrieval activities.

ab: Collision risk with tidal turbines – Tidal turbines may only be deployed at the Warrior Way site, which is the innermost META Project site within the Waterway. Although harbour porpoise may enter the Waterway, it is considered unlikely that they will venture as far up as the Warrior Way site. There is however the potential for the presence of tidal testing devices at the Warrior Way site to present a collision risk to harbour porpoise as they forage in the Waterway. **No potential LSE cannot be concluded** for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of collision risk with tidal devices during the operation phase.

ac: Entanglement risk - As discussed above, although harbour porpoise may enter the Waterway, they are highly unlikely to be present in significant abundances within the Waterway itself although they may be present in the vicinity of the Dale Roads and East Pickard Bay sites. Therefore, there is the potential that the presence of slack lines and/or chains attached to floating wave devices could result in entanglement of harbour porpoise foraging in the vicinity of the META Project. **No potential LSE cannot be concluded** for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of entanglement risk during the operation phase.

ad: Changes in prey resources - As discussed above for a), the number of harbour porpoise predicted in the vicinity of the META Project is low and the sites are not considered to coincide with particularly important foraging ground for harbour porpoise. Significant impacts to the fish and shellfish community are also not anticipated as a result of the META Project and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the META Project are not predicted to affect the availably of prey for harbour porpoise. It can therefore be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of any changes to the fish and shellfish community.

ae: EMF - The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the behaviour of marine mammals. The marine cable at the East Pickard Bay site will provide communication, air and power to support testing at the site and therefore has the potential to emit EMF. However, due to low voltage travelling through the cable, effects are likely to be negligible and any effect would be highly localised to within metres/tens of metres of the cable is not anticipated to result in any effects to the foraging behaviour of harbour porpoise. It can therefore be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of West Wales Marine cSAC from EMF.

af: Disturbance from underwater noise resulting from device operation - Based on available data, only low noise levels are anticipated to be produced during the operation of wave and tidal devices. Given the relatively high levels of baseline noise present within the Waterway resulting from current vessel and industry activity together with the low numbers of harbour porpoise predicted

in the vicinity of the META Project, it can be concluded that there is *no potential for LSE* for Annex II harbour porpoise features of the West Wales Marine cSAC as a result of underwater noise from operational devices.

ag: Accidental release of pollutants across all phases of the META Project – There is the potential for the accidental release of pollutants into the marine environment during installation/retrieval activities, cable installation/removal works at the East Pickard Bay site and during all device operation and maintenance works (i.e. vessel movements, component replacement etc.) to cause toxic effects to harbour seals foraging within the vicinity of the Waterway. This may result from accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). Therefore, **no potential LSE cannot be concluded** to Annex II harbour porpoise features of the West Wales Marine cSAC from the accidental release of pollutants during device installation/retrieval and operation and maintenance.

ah: In-combination effects across all Phases of the META Project – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to cause LSE** to Annex II harbour porpoise features of the West Wales Marine cSAC as a result of in-combination effects during the installation, operation and retrieval phases of the META Project.

Bristol Channel Approaches/Dynesfeydd Môr Hafren cSAC

Table 4.9 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Bristol Channel Approaches cSAC. The LSE identified for the harbour porpoise feature of this SAC are identical for those described above for the West Wales Marine cSAC (Table 4.8) due to the fact that harbour porpoise are highly mobile and forage widely and individuals from both sites have the potential to forage in the vicinity of the META Project sites. The text in Table 4.9 cross-references to Table 4.8 provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.9: Likely significant effects matrix for Annex II marine mammals of the Bristol Channel Approaches cSAC (I: Installation; O: Operation and Maintenance; R: Retrieval)*.

European site features	Vessel noise			Vessel collision risk			Installation noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Harbour porpoise	×v	✓w	×v	×x	✓y	×x	×z			✓ aa		✓ aa		✓ ab			✓ ac		× ad	× ad	× ad		× ae			× af		✓ ag	✓ ag	✓ ag	✓ ah	✓ ah	✓ ah

* Note that the referenced footnotes in this table correspond to those in Table 4.8 for the West Wales Marine cSAC.

Cardigan Bay/ Bae Ceredigion SAC

Table 4.10 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Cardigan Bay SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.10: Likely significant effects matrix for Annex II marine mammals of the Cardigan Bay SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European site features	Vessel noise			Vessel collision risk			Installation noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Bottlenose dolphin	x ai	x ai	x ai	x ai	x ai	x ai	x ai			x ai			x ai				x ai		x ai	x ai		x ai			x ai			x ai	x ai	x ai	x ai	x ai	x ai
Grey seal	x aj	✓ ak	x aj	x al	✓ am	x al	x an			x ao			✓ ap			✓ aq			x ar	x ar		x as			x at			✓ au	✓ au	✓ au	✓ av	✓ av	✓ av

ai: Impacts to bottlenose dolphin – Bottlenose dolphin are highly mobile animals and forage over large areas. Whilst there is understood to be connectivity between the bottlenose dolphin populations of the Cardigan Bay SAC and the Lleyn Peninsula SAC (NRW, 2017b), there is no evidence for connectivity with the Cardigan Bay SAC and the Waterway. For example, the marine mammals surveys undertaken off Pembrokeshire in support of the Marine Renewable Energy Strategic Framework (MRESF) recorded only a single sighting of a bottlenose dolphin offshore of the Bishops and Clerks islands, off Ramsey Sound (RPS, 2011). Furthermore, there are no records of this species occurring within the Waterway on the NBN gateway. It can therefore be concluded that there is *no potential for LSE* for Annex II bottlenose dolphin features of the Cardigan Bay SAC as a result of any of the impacts associated with any phase of the META Project.

aj: Disturbance from vessel noise during META installation and retrieval activities - Grey seal are known to forage over wide areas and it is possible that animals from the site will be present in the vicinity of the META Project. Although grey seal have been recorded in the Waterway, this has been in low numbers (RPS, 2007) and the areas in the vicinity of the META Project are not anticipated to be of particular importance for grey seal. There are no known pupping/breeding sites within the Waterway. Furthermore, the Warrior Way and Dale Roads sites lie within the Waterway which is a busy in terms of vessel traffic. Therefore, it can be assumed that any grey seals present in the vicinity of the META Project are tolerant of the existing level of vessel noise and the uplift in installation/retrieval vessels (i.e. up to 20 test deployments and 20 retrieval operations over a 12 month period at each site involving up to five vessels) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Cardigan Bay SAC as a result of vessel noise during installation and retrieval activities.

ak: Disturbance from vessel noise during operation and maintenance activities – Grey seal are known to forage over wide areas and it is possible that animals from the site will be present in the vicinity of the META Project. The potential uplift in the number of vessel movements per year at each site (i.e. 150 per year for the East Pickard Bay site, 104 visits per year for Dale Roads and 104 visits per year for Warrior Way) may represent a significant shift in the existing vessel movement baseline in the Waterway. Therefore, until the shipping baseline has been developed and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II grey seal features of the Cardigan Bay SAC as a result of disturbance from vessel noise during operation and maintenance activities.

al: Vessel collision risk during META installation and retrieval activities – Grey seal are known to forage over wide areas and it is possible that animals from the site will be present in the vicinity of the META Project sites. The installation and retrieval vessel movements are considered to represent a minimal uplift on the current level of vessel activity in the Waterway. Furthermore, vessels transiting to/from META Project will use the existing shipping lanes within the Waterway and during installation and retrieval activities will be travelling/manoeuvring at slow speeds. I can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Cardigan Bay SAC as a result of vessel collision risk during installation and retrieval activities.

am: Vessel collision risk during operation and maintenance activities – Grey seal are known to forage over wide areas and it is possible that animals from the site will be present in the vicinity of the META Project. Vessels transiting to/from META Project will use the existing shipping lanes, will adhere to the speed restrictions within the Waterway and, during operation and maintenance activities are anticipated to be travelling/manoeuvring at slow speeds. However, the potential uplift in vessel traffic during operation and maintenance is greater than during installation/retrieval. Therefore, until the current shipping baseline has been defined and further details are known on the size/type of vessels involved, **no potential LSE cannot be concluded** for Annex II grey seal features of the Cardigan Bay SAC as a result of vessel collision risk during operation and maintenance activities.

an: Disturbance from installation noise - Based on the expected sound source pressure of drilled piling, it is considered highly unlikely that drilling will result in injury or significant disturbance to marine mammals (Kongsberg, 2012). It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Pembrokeshire Marine SAC as a result of noise during installation activities.

ao: **Increased SSC during device META installation and retrieval activities** – Any levels of increased SSCs generated during installation (e.g. during drilling to install pin piles) and retrieval operations are predicted to be minimal and of short term duration. Significant plumes of increased SSC are not anticipated and any localised increases in SSC will be rapidly dispersed on the tide and therefore there is minimal potential for interference with the foraging of grey seal. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Cardigan Bay SAC as a result of increased SSC levels during installation and retrieval activities.

ap: Collision risk with tidal turbines – Although the number of grey seal predicted in the vicinity of the META Project is low, there is the potential for the presence of tidal testing devices at the Warrior Way site to present a collision risk to grey seal as they forage within the Waterway. **No potential LSE cannot be concluded** for Annex II grey seal features of the Cardigan Bay SAC as a result of collision risk with tidal devices during the operation phase.

aq: Entanglement risk - Although the number of grey seal predicted in the vicinity of the META Project is low, there is the potential that the presence of slack lines and/or chains attached to floating wave and tidal testing devices could result in entanglement of grey seals foraging in the vicinity of the META Project. **No potential LSE cannot be concluded** for Annex II grey seal features of the Cardigan Bay SAC as a result of entanglement risk during the operation phase.

ar: Changes in prey resources - The number of grey seal predicted in the vicinity of the META Project is low and the sites are not considered to be important foraging ground for grey seal. Significant impacts to the fish and shellfish community are not anticipated and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the META Project are not predicted to affect the availably of prey for grey seals. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of the Cardigan Bay SAC as a result of any changes to the fish and shellfish community

as: EMF - The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of migratory fish species. The marine cable at the East Pickard Bay site will provide communication, air and power to support testing at the site and therefore has the potential to emit EMF. However, due to low voltage travelling through the cable, effects are likely to be negligible and any effect would be highly localised to within metres/tens of metres of the cable is not anticipated to result in any barriers to the movement of grey seal. It can therefore be concluded that there is *no potential for LSE* for Annex II grey seal features of Cardigan Bay SAC from EMF.

at: Disturbance from underwater noise resulting from device operation - Based on available data, only low noise levels are anticipated to be produced during the operation of wave and tidal devices. Given the relatively high levels of baseline noise present within the Waterway resulting from current vessel and industry activity together with the low numbers of grey seals predicted in the vicinity of the META Project, *it can be concluded that there is no potential for LSE for* Annex II grey seal features of the Cardigan Bay SAC as a result of underwater noise from operational devices.

au: Accidental release of pollutants across all phases of the META Project– There is the potential for the accidental release of pollutants into the marine environment during installation/retrieval activities, cable installation/removal works at the East Pickard Bay site and during device operation

and maintenance works (i.e. vessel movements, component replacement etc.) to cause toxic effects to grey seals foraging within the vicinity. This may result from accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). **No potential LSE cannot therefore be concluded** for Annex II grey seal features of the Cardigan Bay SAC from the accidental release of pollutants.

av: In-combination effects across all phases of the META Project – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Annex II grey seal features of the Cardigan Bay SAC as a result of in-combination effects during the installation, operation and retrieval phases of the project.

Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC

Table 4.11 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Lleyn Peninsula and the Sarnau SAC. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.11: Likely significant effects matrix for Annex II marine mammals of the Cardigan Bay SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European site features	Vessel noise			Vessel collision risk			Installation noise			Increased SSC			Collision risk with tidal turbine			Entanglement risk			Changes in prey resources			EMF			Underwater noise from device			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Bottlenose dolphin	x aw	x aw	x aw	x aw	x aw	x aw	x aw			x aw		x aw		x aw			x aw		x aw	x aw	x aw		x aw			x aw		x aw	x aw	x aw	x aw	x aw	x aw

aw: Impacts to bottlenose dolphin – Bottlenose dolphin are highly mobile animals and forage over large areas. Whilst there is understood to be connectivity between the bottlenose dolphin populations of the Cardigan Bay SAC and the Lleyn Peninsular SAC (NRW, 2017b), there is no evidence for connectivity with the Lleyn Peninsular SAC and the Waterway. For example the marine mammals surveys undertaken off Pembrokeshire in support of the Marine Renewable Energy Strategic Framework (MRESF) recorded only a single sighting of a bottlenose dolphin offshore of the Bishops and Clerks islands (off Ramsey Sound). Furthermore, there are no records of this species occurring within the Waterway on the NBN gateway. It can therefore be concluded that there is *no potential for LSE* for Annex II bottlenose dolphin features of the Lleyn Peninsular SAC as a result of any of the impacts associated with any phase of the META Project.

Pembrokeshire Bat Sites and Bosherton Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton SAC

Table 4.12 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Pembrokeshire Marine/Sir Benfro Forol SAC. Where effects are not applicable to a particular feature they are greyed out.

Table 4.12: Likely significant effects matrix for terrestrial habitats and species of the Pembrokeshire Bat Sites and Bosherton Lakes SAC (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Disturbance to habitats/species			Habitat fragmentation and severance			Habitat loss			Displacement of species			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Otter	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m	✓m

m: Impact to otters - On the basis of the distance of this site from the proposed onshore works at East Pickard Bay (~20 km), it is considered highly unlikely that the site forms part of the core foraging range for the otters associated with the Pembrokeshire Bat Sites and Bosherston Lakes SAC although the site is located within the maximum foraging ranges recorded for the species – 54 km males and 24 km females (Durbin *et al.*, 1996). As such a potential pathway of interaction exists and therefore **no potential for LSE cannot be concluded** for Annex II otter features of the Limestone Coast of South West Wales SAC as a result of potential interactions through disturbance, habitat loss, habitat fragmentation/severance, displacement, accidental pollution and in combination effects of the onshore elements of the META Project.

4.2.4 Annex II marine ornithological features

A description of those European sites with Annex II marine ornithological qualifying interest features identified in Section 3.13.4 with the potential to interact with the offshore elements of the META Project is provided in the following sections. These comprise:

- Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA;
- Grassholm SPA;
- Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA,
- Irish Sea Front SPA,
- Lambay Island SPA;
- Saltee Islands SPA; and
- Rathlin Island SPA.

Site Overviews

Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA

Skomer, Skokholm and the Seas off Pembrokeshire SPA is located off the south-west tip of Pembrokeshire in Welsh territorial and UK offshore waters (see Figure 3.4). It includes the islands of Skomer and Skokholm. The marine area of the SPA is physically and hydrographically diverse, with high levels of primary productivity. The associated growth and concentration of zooplankton and fish offers rich feeding resources for seabirds and mammals.

The SPA qualifies under Article 4.1 of the Birds Directive, by regularly supporting the Annex I species: European storm petrel, red-billed chough and short-eared owl; and qualifies under Article 4.2 by supporting internationally important breeding populations of the regularly occurring migratory species: Manx shearwater, Atlantic puffin, and lesser black-backed gull. Furthermore, the Skomer, Skokholm and the Seas off Pembrokeshire SPA protects an assemblage of breeding seabirds (394,260 birds), the listed components of which are Manx shearwater, European storm petrel, Atlantic puffin, black-legged kittiwake, razorbill, common guillemot, and lesser black-backed gull.

The islands of Skomer and Skokholm support the largest concentration of breeding seabirds in England and Wales. They hold the largest breeding colony of Manx shearwater in the world (considered to be 316,000 pairs), one of the largest colonies of lesser black-backed gull in Britain (currently over 10,000 apparently occupied sites), as well as being important Welsh breeding sites for other seabird populations, such as razorbill, black-legged kittiwake, Atlantic puffin and common guillemot, supporting a breeding seabird assemblage of over 394,000 birds.

Grassholm SPA

Grassholm is a small island which lies about 18 km west of the mainland coast of Pembrokeshire in south-west Wales (see Figure 3.4). The island is approximately 9 ha in size and is designated as a National Nature Reserve. It is a low, flat-topped basalt island with limited terrestrial vegetation due to the effects of large numbers of breeding seabirds, together with the influence of salt spray and wind exposure. The island is a remnant of ancient lava flows, with shallow soils overlaying the basalt.

Grassholm is of major importance as a breeding site for gannet. During the breeding season it supports approximately 32,000 pairs of gannet. The colony is of international importance, supporting approximately 12% of the world population. The seabirds feed outside the SPA in nearby waters, as well as more distantly elsewhere in the Irish Sea.

Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA

The Aberdaron Coast and Bardsey Island SPA holds an internationally important Manx Shearwater colony and important numbers of wintering chough. The shearwaters feed outside the SPA in the nearby waters as well as more distantly in the Irish Sea.

The SPA, is located at the tip of the Lleyn Peninsula in north-west Wales (see Figure 3.4). The site consists of the island of Bardsey (Ynys Enlli) and part of the tip of the Lleyn Peninsula, together with two smaller islands – the Gwylans. The coastline is rocky, with many crags, screes and low cliffs. The Aberdaron coast consists of a series of heather-covered hills rising to about 190 m, separated by valleys occupied by pastures. The maritime heaths are dominated by Heather *Calluna vulgaris*, Bell Heather *Erica cinerea* and Western Gorse *Ulex gallii* and are exposed to strong westerly winds. The Mountain on Ynys Enlli has similar heathland to the mainland, whilst the sheltered screes on the north-east of the island have a rich fern and bryophyte flora. The site supports a resident population of chough *Pyrrhocorax pyrrhocorax* which depend on the diverse mix of habitats present and their low-intensity agricultural management. The site also holds a large breeding colony of Manx shearwaters. The shearwaters feed outside the SPA in the nearby waters as well as more distantly in the Irish Sea

Irish Sea Front SPA

The Irish Sea Front SPA lies in the Irish Sea, about 35 km southwest of the Isle of Man and 36 km to the northwest of Anglesey (see Figure 3.4). The site is known to regularly support a population of European importance for Manx shearwater which use the area as a foraging location during the breeding season.

The Irish Sea Front SPA is the third largest marine aggregation of breeding Manx shearwaters identified in the UK (Kober *et al.*, 2012). Data from the extensive European Seabirds at Sea (ESAS) database suggest that more than 12,000 Manx shearwater could be present in the area. Tracking studies indicate that Manx shearwaters from at least three different colonies around the Irish Sea (Northern Ireland, Wales and Devon) are likely to use the Irish Sea Front SPA for foraging during the breeding season.

This site is located over part of a large tidal front which forms in the spring every year. This tidal front creates an area of very productive sea, with high concentrations of zooplankton leading to large numbers of prey species contributing to the sites importance.

Lambay Island SPA

Lambay Island SPA holds an internationally important seabird colony and is one of the top seabird sites in Ireland. Three seabird species have breeding populations of international importance and a further six have populations of national importance. In addition to the seabirds, the island also supports nationally important wintering populations of greylag goose and herring gull.

Lambay Island lies approximately 4 km off the north Co. Dublin coastline and is separated from it by a channel of 10-13 m in depth (see Figure 3.4). East of Lambay Island the water deepens rapidly into the Irish Sea basin. The island, which rises to 127 m, has an area of 250 ha above high tide mark. Lambay Island is internationally important for its breeding seabirds and is of particular note for the diversity of these, with 12 species breeding regularly.

The site is a SPA under the E.U. Birds Directive, of special conservation interest for the following species: fulmar, cormorant, shag, greylag goose, lesser black-backed gull, herring gull, kittiwake, guillemot, razorbill and puffin. The site is also of special conservation interest for holding and assemblage of over 20,000 breeding seabirds. A survey in 2004 recorded breeding cormorant (352 pairs), shag (1,734 pairs), guillemot (38,999 pairs), fulmar (727 pairs), lesser black backed gull (133

pairs), herring gull (311 pairs), great black-backed gull (145 pairs), kittiwake (3,947 pairs), razorbill (3,805 pairs) and puffin (209 pairs). The island's populations of cormorant, shag, herring gull and guillemot are the largest in Ireland. Lambay Island holds the only known colony of Manx shearwater (25 pairs in 2002) on the east coast of Ireland; in addition, black guillemot also breeds here (4 pairs in 1999). In 2007 two new species were added to the island's list of breeding seabirds: gannet (68 pairs) and common gull (1 pair).

In winter, Lambay Island supports nationally important populations of greylag goose (311) and herring gull (2,400) – figures are the five year mean peak for the winters 1995/96-1999/2000. Up to the mid 1990s, a barnacle goose flock wintered on the island (the only such flock in eastern Ireland) but these have since abandoned the site. Other species which utilise the site during the winter include light-bellied Brent goose (55), oystercatcher (155), purple sandpiper (9), curlew (211) and turnstone (32). Lambay Island is also the only regular wintering site in Ireland for whimbrel (5 in 2006).

Saltee Islands SPA

The Saltee Islands SPA is of international importance for breeding seabirds; it also supports populations of three species that are listed on Annex I of the E.U. Birds Directive, i.e. peregrine, chough and hen harrier.

The Saltee Islands SPA is situated some 4-5 km off the coast of south Co. Wexford and comprises the two islands, Great Saltee and Little Saltee, and the surrounding seas both between them and to a distance of 500 m from them (see Figure 3.4). The bedrock of the islands is of Precambrian gneiss and granite. Both islands have exposed rocky cliffs on their south and east – those on Great Saltee being mostly c. 30 m high, those on Little Saltee about half this height. The northern and western sides of both islands are fringed with shingle and boulder shores, backed by boulder clay cliffs, as well as small areas of intertidal sandflats. Sea caves occur at the base of the cliffs on Great Saltee.

The site is an SPA under the E.U. Birds Directive, of special conservation interest for the following species: fulmar, gannet, cormorant, shag, lesser black-backed gull, herring gull, kittiwake, guillemot, razorbill and puffin. The site is also of special conservation interest for holding an assemblage of over 20,000 breeding seabirds. The nationally important gannet colony on Great Saltee has been well documented since its establishment in the 1920s and 2,446 pairs were present in 2004. The following species have populations of national importance (all (all counts in the 1998-2000 breeding seasons): fulmar (520 pairs), cormorant (273 pairs), shag (268 pairs), lesser black-backed gull (164 pairs), herring gull (73 pairs), kittiwake (2,125 pairs), guillemot (14,362 pairs), razorbill (2,505 pairs) and puffin (1,822 pairs). An estimated 250 pairs of Manx shearwater occur on these islands.

Rathlin Island SPA

The Rathlin Island SPA is of international importance for breeding seabirds; it also supports populations of two species that are listed on Annex I of the E.U. Birds Directive, i.e. peregrine and chough.

Rathlin Island is a large inhabited marine island situated some 4 km from the north Antrim coast of Northern Ireland (see Figure 3.4). There are basalt and chalk cliffs, some as high as 100 m, as well as several sea stacks on the north and west shores of the island.

Rathlin Island SPA qualifies under Article 4.1 of EC Directive 79/409 on the Conservation of Wild Birds by supporting nationally important numbers of the Annex I species peregrine falcon. In 2008 only one pair of the Annex I species chough also bred on the site.

The site also qualifies under Article 4.2 of the Directive by supporting internationally important breeding numbers of the migratory species razorbill, guillemot and kittiwake. Additionally, under Article 4.2, Rathlin Island SPA regularly supports over 20,000 breeding seabirds. Species include, fulmar, shag, eider, common gull, herring gull, lesser black-backed gull, black guillemot, puffin and Manx shearwater.

Determination of LSE

Skomer, Skokholm and the Seas off Pembrokeshire SPA

Table 4.12 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature, they are greyed out.

Table 4.13: Likely significant effects matrix for marine ornithological features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision (entrapment) risk with vessels/ structures			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Atlantic puffin	×a	×a	×a	×b	×b	×b		×c		×c	✓c	×c	✓d	✓d	✓d	✓o	✓o	✓o
European storm petrel	×e	×e	×e	×b	×b	×b		×f		×f	✓f	×f	✓d	✓d	✓d	✓o	✓o	✓o
Lesser black-backed gull	×g	×g	×g	×b	×b	×b		×g		×g	×g	×g	✓d	✓d	✓d	✓o	✓o	✓o
Manx shearwater	×h	×h	×h	×b	×b	×b		×h		×h	×h	×h	✓d	✓d	✓d	✓o	✓o	✓o
Razorbill	×i	×i	×i	×b	×b	×b		×j		×j	✓j	×j	✓d	✓d	✓d	✓o	✓o	✓o
Common guillemot	×k	×k	×k	×b	×b	×b		×l		×l	✓l	×l	✓d	✓d	✓d	✓o	✓o	✓o
Black-legged kittiwake	×m	×m	×m	×b	×b	×b		×n		×n	✓n	×n	✓d	✓d	✓d	✓o	✓o	✓o

a: Impacts to Atlantic puffin (noise disturbance from vessels) – Puffin show only moderate sensitivity to disturbance from boat traffic (Garthe and Hüppop, 2004), and this accompanied with their plasticity in diet means they are unlikely to be strongly affected by displacement, if alternative, accessible prey supplies exist (McCluskie *et al.*, 2012). Furthermore, the Warrior Way and Dale Roads sites lie within the Waterway which is a busy in terms of vessel traffic. Therefore, it can be assumed that any Atlantic puffin present in the vicinity of the META Project are tolerant of the existing level of vessel noise and the uplift in installation/retrieval and operational vessels (i.e. up to 20 test deployments and 20 retrieval operations over a 12 month period at each site involving up to five vessels and up to 104 vessel movements at each of the Dale Road and Warrior Way sites and 150 movements at the East Pickard Bay site over a 12 month period and) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for Atlantic puffin features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of vessel noise during installation, operation and retrieval activities.

b: Impacts through changes to fish and shellfish community (all species) – Significant impacts to the fish and shellfish community are not anticipated as a result of the META Project and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the Project are not predicted to affect the availability of prey for any feature species of the Skomer, Skokholm and the Seas off Pembrokeshire SPA. It can therefore be concluded that there is *no potential for LSE* on bird features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of any changes to the fish and shellfish community.

c: Impacts to Atlantic puffin (collision with turbines, structures or vessels) – Puffins have a moderate flight manoeuvrability and low flight height (Garthe and Hüppop, 2004). As such puffins are vulnerable to above surface collisions with vessels and devices. Puffin are also capable of diving relatively deep in pursuit of prey and have been shown to have a strong association with fast horizontal current speeds indicating that they are particularly likely to interact with in-stream tidal installations during the breeding season (Waggit *et al.*, 2016) and are also therefore susceptible to below surface collision. However, Warrior Way is the sole META site that will support tidal turbines and is restricted a maximum rotor swept area of 78.5 m^2 at any one time. Given this site is also located upstream in the Waterway circa 20 km from the SPA colony and given radio tracking at the Isle of May recorded 64% of puffin flights within 2 km of the colony and only 29% more than 10 km (Bradstreet and Brown, 1985), the risk of Atlantic puffin tidal turbine collision is considered low. As such it is concluded that there is *no potential for LSE* for Atlantic puffin features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with tidal turbines. However, given the noted sensitivity of the species to collision and the net increase in vessel movements and above surface structures in areas within the Waterway and East Pickard bay **no potential LSE cannot be concluded** for Atlantic puffin features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during device operation. However, it can be concluded that there is *no potential for LSE* for Atlantic puffin features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the installation/retrieval phases given the lack of above surface features and lower vessel movement activity.

d: Impacts of accidental pollution (all species) – As Atlantic puffin, Manx shearwater, razorbill, common guillemot and black-legged kittiwake spend much time on the water surface, they will be vulnerable to contamination by oil-based pollutants. European storm petrel spend little time sitting on the water, so have a lower susceptibility to pollution. There is the potential for the accidental release of pollutants into the marine environment during installation/retrieval activities, marine cable installation/removal works and during device operation and maintenance works (i.e. vessel movements, component replacement etc.). This may result from accidental spills or leaks (e.g. fuels, diesel oils, synthetic chemicals etc.). Therefore, **no potential LSE cannot be concluded** on ornithological features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of accidental pollution.

e: Impacts to European storm petrel (noise disturbance from vessels) – European storm petrel have a relatively high tolerance of disturbance (McCluskie *at al*., 2012) and will occasionally follow ships and attend trawlers (McCluskie *et al*., 2012). The distributions of foraging storm petrels are poorly understood. Concentrations are to be found offshore to the west of the breeding colonies, notably at the Northern Isles, Hebrides, North West coast of Scotland, Kintyre and Pembrokeshire (Mitchell *et al*., 2004), and the highest densities are above the shelf edge and continental shelf (King *et al*., 2009) and as such are considered unlikely to be present in META site areas in significant numbers. It can therefore be concluded that there is *no potential for LSE* for European storm petrel features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of vessel noise during installation, operation and retrieval activities.

f: Impacts to European storm petrel (collision with turbines, structures or vessels) - They forage on the wing, obtaining food from the surface of the water by snatching, dipping and skimming, or sometimes by "pattering", flapping their wings and kicking their feet across the water surface. Foraging is almost entirely carried out at night, and they commute between foraging sites and breeding colonies in the dark, probably as an anti-predator strategy. During summer nights, petrels will regularly forage inshore (D'Elbee and Hemery, 1998). European storm petrel although agile in flight, fly low above the water surface, spend the majority of their time in flight, and often fly in darkness during the breeding season. Consequently, they have a relatively high risk of collision with above surface structures. Conversely, as surface feeders they have a low risk of below surface collision. As such it can be concluded that there is *no potential for LSE* for European storm petrel features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with tidal turbines. However, given the noted sensitivity of the species to collision with above surface structures and the net increase in vessel movements and above surface structures in areas within the Waterway and East Pickard bay **no potential LSE cannot be concluded** for European storm petrel features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during device operation. However, there is *no potential for LSE* for European storm petrel features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the installation/retrieval phases given the lack of above surface features and lower vessel movement activity.

g: Impacts to lesser black-backed gulls - Lesser black-backed gulls are highly manoeuvrable in flight and tend to fly relatively high above the water surface (Garthe and Hüppop, 2004) reducing their exposure to and risk of above surface collisions. They are surface feeders and consequently have a low risk of below surface collisions. Lesser black-backed gulls are also used to the presence of man, both onshore and offshore and are in general highly tolerant of disturbance (McCluskie *et al*., 2012). As such, is can be concluded that there is *no potential for LSE* as a result of impacts through noise disturbance from vessels or collision with turbines, structures or vessels has been reached.

h: Impacts to Manx shearwater - During May-June, the highest densities are found in the continental shelf in the Celtic and Irish Seas, particularly around the main breeding colonies (Stone *et al*., 1995). Later in the season, during June-August, the highest densities are concentrated in the waters to the south and west of the Isle of Man, and in the Celtic Sea. Guilford *et al*. (2008) used GPS tracking to identify foraging areas for the SPA colony, this was largely concentrated in the Irish Sea, with foraging areas identified to the north, and more diffusely to the west of the colony. No foraging excursions were recorded significantly to the south of the colony. In terms of diet, Manx shearwater are essentially piscivorous, but will also eat cephalopods and small invertebrates. Their prey (largely small shoaling fish i.e. clupeids) are usually associated with the frontal systems and stratified waters. As such in light of the above, significant spatial overlap of Manx shearwater with the META sites is considered unlikely. This lack of spatial overlap allows a conclusion of *no potential for LSE* as a result of impacts through noise disturbance from vessels, changes to fish and shellfish community or collision with turbines, structures or vessels.

i: Impacts to razorbill (noise disturbance from vessels) - Razorbills feed mainly on shoaling fish; mostly sandeel for birds at breeding colonies in British Isles, supplemented by herring, sprat, and rockling (McCluskie *et al*., 2012). Razorbill do however generally feed in fairly shallow waters offering predictable feeding conditions, often over sandy sea beds, although in winter they can be more associated with nutrient upwelling tidal fronts (Skov *et al*., 2000). Studies from the Isle of May, recorded almost half of all razorbill foraging trips within 10 km of the coast (Thaxter *et al*., 2010) with a maximum distance reached from the colony was 18.42 km. Recent work by Wakefield *et al*., (2017) using GPS tracking data to predict spatial distributions of razorbill identifies the Waterway and East Pickard Bay as areas of relatively lower suitability than areas of higher importance located to the south and west although both the Dale Road and East Pickard sites are identified as potentially suitable habitat. In light of the above and the proximity of the Skomer, Skokholm and the Seas off Pembrokeshire SPA to the META sites (~20 km) spatial overlap of razorbill with the Dale Road and East Pickard bay sites within the META development is possible. Razorbills are noted to display moderate susceptibility to disturbance from vessel activity (McCluskie *et al*., 2012). With little flight manoeuvrability and low flight height (Garthe and Hüppop, 2004), razorbills are likely to be at risk of above surface collisions. As the Dale Road and East Pickard bay sites lie in close proximity to the Waterway which hosts significant vessel traffic it can be assumed that any razorbill present are tolerant of the existing level of vessel noise and the uplift in vessels through installation, operation and retrieval (i.e. up to 104 vessel movements at each of the Dale Road and Warrior Way sites and 150 movements at the East Pickard Bay site over a 12 month period) will represent only a small increase on this existing baseline. It can therefore be concluded that there is *no potential for LSE* for razorbill features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of vessel noise during installation, retrieval or operational activities.

j: Impacts to razorbill (collision risk with turbines, vessels or surface structures) - Razorbill catch their prey by surface-diving. Dive times are relatively short (Thaxter *et al*., 2010) and frequent. Dives are relatively shallow with little time spent in the bottom phase of the dive reducing their potential exposure to turbine collision. This, along with their lack of predicted spatial overlap with the Warrior way site (Wakefield *et al*., 2017) allows a conclusion of *no potential for LSE* as a result of collision risk with tidal turbines. However, given the noted sensitivity of the species to collision with above surface structures and the net increase in vessel movements and above surface structures at Dale Road and East Pickard bay **no potential LSE cannot be concluded** for razorbill features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the operational stage of the development. However, a conclusion of *no potential for LSE* is made for razorbill features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the installation/retrieval phases given the lack of above surface features and significantly lower vessel movement activity.

k: Impacts to common guillemot (noise disturbance from vessels) - The main prey items of the adult common guillemot are shoaling pelagic fish (i.e. sandeel, herring and sprats, small gadoids). Their at-sea distribution is largely influenced by that of their prey (Wright and Begg, 1997). Recent work by Wakefield *et al*. (2017) using GPS tracking data to predict fine scale spatial distributions of common guillemot identifies Dale Road and East Pickard Bay as areas of relatively low suitability for common guillemot with Warrior way site of negligible predicted suitability. Areas of higher importance are predicted to the south and west. The Dale Road and East Pickard bay sites lie in close proximity to the Waterway, which supports significant vessel traffic. As such it can be assumed that any common guillemot present are tolerant of the existing level of vessel noise and the uplift in vessels through installation, operation and retrieval (i.e. up to 104 vessel movements at each of the Dale Road and Warrior Way sites and 150 movements at the East Pickard Bay site over a 12 month period) will represent only a small increase on this existing baseline. This in-combination with the low suitability of the habitat (Wakefield *et al*., 2017) allows a conclusion of *no potential for LSE* on common guillemot features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of vessel noise during installation, retrieval or operational activities.

l: Impacts to common guillemot (collision risk with turbines, vessels or surface structures) - Common guillemots fly low and have a low flight manoeuvrability (King *et al*., 2009), and so are at risk of collision with above surface structures. They also have relatively long flight times to feeding areas potentially increasing their exposure to collision. Furthermore, as single-prey loaders they may have to make numerous repeat flights to provision chicks, depending on the size of prey. When feeding they spend a high proportion of time under-water and have a fast rate of ascent, meaning they have a high risk of below surface collision. However, due to their lack of predicted spatial overlap with the Warrior way site (Wakefield *et al*., 2017) a conclusions of *no potential for LSE* as a result of collision risk with tidal turbines has been made. However, given the noted sensitivity of the species to collision with above surface structures and the net increase in vessel movements and above surface structures at Dale Road and East Pickard bay **no potential LSE cannot be concluded** for common guillemot features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the operational stage of the development. However, it is concluded that there is *no potential for LSE* for common guillemot features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the installation/ retrieval phases given the lack of above surface features and significantly lower vessel movement activity.

m: Impacts to kittiwake (noise disturbance from vessels) - Kittiwakes are pelagic surface feeders feeding in the upper couple of metres of the water column. They take fish from flight through dipping or shallow plunge-diving and during the breeding season feed mainly on pelagic shoaling fish, such as sandeel, sprat and clupeids. During the non-breeding season, they are essentially oceanic and are frequently associated with fronts, tidal upwellings and offshore sandbanks (Ratcliffe *et al*., 2000). A maximum foraging distance of 83 km has been measured for kittiwake (Humphreys *et al*., 2006). Recent work by Wakefield *et al*. (2017) using GPS tracking data to predict fine scale spatial distributions of kittiwake identifies the Dale Road and East Pickard Bay areas as of relatively low suitability, with Warrior way site of negligible predicted suitability. The area of predicted highest suitability is located to the north associated with St Brides Bay. The Dale Road and East Pickard Bay sites lie in close proximity to the Waterway which supports significant vessel traffic. As such it can be assumed that any kittiwake present are tolerant of the existing level of vessel noise and the uplift in vessels through installation, operation and retrieval (i.e. up to 104 vessel movements at each of the Dale Road and Warrior Way sites and 150 movements at the East Pickard Bay site over a 12 month period) will represent only a small increase on this existing baseline. This in-combination with the low suitability of the habitat (Wakefield *et al*., 2017) and thus likely presence of this species allows a conclusion of *no potential for LSE* on kittiwake features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of vessel noise during installation, retrieval or operational activities

n: Impacts to kittiwake (collision risk with turbines, vessels or surface structures) - Garthe and Hüppop (2004) considered kittiwakes to be one of the least sensitive species to offshore wind farms. However, this was based in part on flight height, which is relatively low, and they are considered to have a moderate level of vulnerability to above surface collisions (McCluskie *et al*., 2012). Sub surface collisions and entrapment are unlikely, as they are visual surface feeders. This, in-combination with the low suitability of the habitat at the Warrior way site (Wakefield *et al*., 2017), allows a conclusion of *no potential for LSE* on kittiwake features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of turbine collision. However, given the noted sensitivity of the species to collision with above surface structures and the net increase in vessel movements and above surface structures at Dale Road and East Pickard bay **no potential LSE cannot be concluded for** kittiwake features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the operational stage of the development. However, it is concluded that there is *no potential for LSE* for kittiwake features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of collision risk with vessels or surface structures during the installation/retrieval phases given the lack of above surface features and significantly lower vessel movement activity.

o: In-combination effects during installation, operation and retrieval – Activities associated with planned projects or other activities in the vicinity of the META Project have the **potential to result in LSE** to Atlantic puffin, European storm petrel, razorbill, common guillemot and kittiwake features of the Skomer, Skokholm and the Seas off Pembrokeshire SPA as a result of in-combination effects across all phases of the project.

Grassholm SPA

Table 4.13 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Grassholm SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.14: Likely significant effects matrix for marine ornithological features of the Grassholm SPA (I:- Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision risk (entrapment) with vessels			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Gannet	×p	×p	×p	×q	×q	×q		×p		×p	×p	×p	×p	×p	×p	×r	×r	×r

p: Impacts through noise disturbance from vessels, collision and accidental pollution - Gannets are opportunistic, generalist predators; their diet is primarily shoaling pelagic fish such as mackerel, herring and gadoids. Prey are captured from plunge dives, 10-40 m above the surface. They also exploit a range of other prey species as well as fishery discards. There is also a high degree of plasticity in foraging flight behaviour, which can vary as a function of sea temperature, primary production, copepod abundance, colony location and size, and human activities (Lewis *et al*., 2001; Votier *et al*., 2010a). Generally, they forage in the relatively shallow continental shelf or coastal waters. Grassholm has been host to significant research activity on gannets with multiple tracking studies undertaken (i.e. Patrick *et al*., 2014, Voiter *et al*., 2011, Voiter *et al*., 2010b) in recent years these tracks show little to no overlap with META sites within the Waterway and a small number of occurrences in proximity to the East Pickard Bay and Dale Road sites. Grecian *et al*. (2012) also utilised tracking data to predict important at-sea areas for gannet in the region and none of the META sites are located in the identified regions of importance from this study. In addition, recent studies in Scotland have identified an increased density of northern gannet, during summer, in the presence of a wave energy coverer device. These results suggest that no avoidance or extreme change in distribution as a result of the presence of a WEC (Leesa *et al*., 2016). In light of the above distributional information for the region and study area, significant spatial overlap of gannet with the META sites is considered unlikely. This lack of spatial overlap along with the recent evidence of low sensitivity to device installation through disturbance or displacement and the species tolerance to vessel disturbance allow a conclusion of *no potential for LSE* as a result of impacts through noise disturbance from vessels or collision with turbines, structures or vessels or from accidental pollution.

q: Impacts through changes to fish and shellfish community – Significant impacts to the fish and shellfish community are not anticipated as a result of the META Project and, therefore, any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the Project are not predicted to affect the availability of prey for gannet from the Grassholm SPA. It can therefore be concluded that *no potential for LSE* on the Grassholm SPA as a result of any changes to the fish and shellfish community.

r: In-combination effects during device installation, operation and retrieval – Activities associated with planned projects or other activities in the vicinity of the META Project have *no potential for LSE* to gannet features of the Grassholm SPA as a result of in-combination effects of the project.

Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA

Table 4.14 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature they are greyed out.

Irish Sea Front SPA

Table 4.15 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Irish Sea Front SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.15: Likely significant effects matrix for marine ornithological features of the Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA and Irish Sea Front SPA (I:- Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision risk with vessels			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Manx shearwater	×s	×s	×s	×s	×s	×s		×s		×s	×s	×s	×s	×s	×s	×s	×s	×s

s: Impacts to Manx shearwater - During May-June, the highest densities of Manx shearwater are found in the continental shelf in the Celtic and Irish Seas, particularly around the main breeding colonies (Stone *et al.*, 1995). Later in the season, during June-August, the highest densities are concentrated in the waters to the south and west of the Isle of Man, and in the Celtic Sea. In terms of diet Manx shearwater are essentially piscivorous but will also eat cephalopods and small invertebrates. Their prey (largely small shoaling fish i.e. clupeids) are usually associated with the frontal systems and stratified waters. As such, significant spatial overlap of Manx shearwater with the META sites is considered unlikely. This lack of spatial overlap allows a conclusion of *no potential for LSE*.

Lambay Island SPA

Table 4.15 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Lambay Island SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.16: Likely significant effects matrix for marine ornithological features of the Lambay Islands SPA (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision risk with vessels			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Fulmar	×t	×t	×t	×u	×u	×u		×t		×t	×t	×t	×t	×t	×t	×v	×v	×v

t: Impacts on fulmar - Fulmar are known to frequently use discards from commercial fisheries, although the level of dependency varies by location (Phillips *et al*., 1999, Camphuysen and Garthe, 1997). Fulmar also actively forage for fish, squid and zooplankton. Primarily they are surface feeders and will seize prey seen from flight, although they also splash dive, although rarely more than 3 m from the surface (Garthe and Furness, 2001). They hunt both during the day and night (Ojowski *et al*., 2001). Fulmar are however considered a truly offshore feeder, with birds regularly departing from breeding colonies for more than 4-5 days on foraging trips and travelling to over 500 km from the colony (Weimerskirch *et al*., 2001). Recent evidence has also identified foraging trips to the Mid-Atlantic Ridge (Edwards *et al*., 2013). During the provisioning of chicks, foraging is closer to the colony (Furness and Todd, 1984; Weimerskirch *et al*., 2001) and the distribution of fishing effort relative to the colony size is believed to be an important determinant of the foraging range (Garthe and Hüppop, 1994). Due to their truly pelagic nature, spatial overlap of fulmar with the META project is considered unlikely. This, combined with their noted tolerance of human disturbance, allow a conclusion of *no potential for LSE* as a result of impacts through noise disturbance from vessels or collision with turbines, structures or vessels. This lack of spatial overlap in combination with the fact that below surface collisions are considered unlikely (McCluskie *et al*., 2012) as food is located by sight and taken from the top three metres of the water column. They do have some vulnerability to collisions with vessels, but this is considered low as they spend relatively little time on the water surface. In light of the above, a conclusion of *no potential for LSE* as a result of impacts through noise disturbance from vessels, accidental pollution or collision with turbines, structures or vessels has been reached.

u: Impacts through changes to fish and shellfish community – Significant impacts to the fish and shellfish community are not anticipated as a result of the META Project, and therefore any subtle changes to the fish and shellfish community, should they arise as a result of the installation/retrieval and/or the operation and maintenance of the Project, are not predicted to affect the availability of prey for fulmar from the Lambay Island SPA. It can therefore be concluded that *no potential for LSE* on the Lambay Island SPA as a result of any changes to the fish and shellfish community.

v: In-combination effects during device installation, operation and retrieval – Activities associated with planned projects or other activities in the vicinity of the META Project have *no potential for LSE* to fulmar features of the Lambay Island SPA as a result of in-combination effects of the project.

Saltee Islands SPA

Table 4.16 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Saltee Islands SPA. The LSE identified for the fulmar feature of this SPA are identical for those described for the Lambay Islands SPA (Table 4.15). The text provided in Table 4.16 cross-referenced to Table 4.15 provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA feature. Where effects are not applicable to a particular feature they are greyed out.

Table 4.17: Likely significant effects matrix for marine ornithological features of the Saltee Islands SPA (I: Installation; O: Operation and Maintenance; R: Retrieval)*.

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision risk with vessels			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Fulmar	×t	×t	×t	×u	×u	×u		×t		×t	×t	×t	×t	×t	×t	×v	×v	×v

* Note that the referenced footnotes in this table correspond to those in Table 4.15 for the Lambay Islands SPA.

Rathlin Islands SPA

Table 4.17 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Rathlin Islands SPA. The LSE identified for the fulmar feature of this SPA are identical for those described for the Lambay Islands SPA (Table 4.15). The text provided in Table 4.17 cross-referenced to Table 4.15 provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA feature. Where effects are not applicable to a particular feature they are greyed out.

Table 4.18: Likely significant effects matrix for marine ornithological features of the Rathlin Island SPA (I: Installation; O: Operation and Maintenance; R: Retrieval)*.

European Site Features	Noise disturbance from vessels			Changes to fish and shellfish community			Collision risk with tidal turbines			Collision risk with vessels			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Fulmar	×t	×t	×t	×u	×u	×u		×t		×t	×t	×t	×t	×t	×t	×v	×v	×v

* Note that the referenced footnotes in this table correspond to those in Table 4.15 for the Lambay Islands SPA.

4.2.5 Sites designated for Annex II onshore/ coastal ornithological features

A description of those European sites with terrestrial ornithological species as qualifying interest features identified in Section 3.6 with the potential to interact with the META Project is provided in the following sections. These comprise:

- Castlemartin Coast SPA.

Site Overview

Castlemartin Coast SPA

The exposed sea cliff features of this SPA are of importance for breeding Chough, which exploit their immediate hinterland. Chough depend on the diverse mix of habitats present within the site and adjacent habitat, and their continued low-intensity agricultural management. The chough population level in 1993, at the time of designation, was 12 pairs (then approximately 3.5% of the UK population). Based on annual surveillance and 2002 decadal survey results, the number of pairs of chough attempting to breed within the SPA has increased to about 20 pairs. In 2007, the breeding population was similar to that of 2002 (at least 20 pairs attempted to breed from 22 territory-holding pairs) (CCW, 2008). Breeding chough present out-with the SPA but on adjacent cliffs are likely to be considered as part of the same breeding population.

Determination of LSE

Castlemartin Coast SPA

Table 4.19 provides a summary of the assessment undertaken to conclude whether it can be determined that there will be no LSE as a result of the META Project on relevant qualifying interest features of the Castlemartin Coast SPA. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these likely significant effects on the identified SPA features. Where effects are not applicable to a particular feature they are greyed out.

Table 4.19: Likely significant effects matrix for terrestrial ornithological features of the Castlemartin Coast SPA (I: Installation; O: Operation and Maintenance; R: Retrieval).

European Site Features	Disturbance to habitats/species			Habitat fragmentation and severance			Temporary displacement of species			Habitat loss and disturbance/ displacement of species			Accidental pollution			In-combination effects		
	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R	I	O	R
Chough *Pyrrhocorax pyrrhocorax*	×a	√b	×a	×c	√d	×c	×e	√f		×a	√b	×a	×g	×g	×g	×h	√h	×h

a: Disturbance during onshore construction and removal activities - There is the potential for noise and the physical presence of personnel required for the installation and removal of the marine cable up to MHWS at East Pickard Bay, to result in temporary and short-term disturbance to breeding and/or wintering chough of the SPA. However, all works will be restricted to daylight hours and cable installation will occur only during the over-winter period for chough of September to February. As there will be no disturbance to potential breeding areas in cliff habitat and works will be spatially limited thus minimising impact on wintering chough. Therefore, there is *no potential for LSE* for chough features of the Castlemartin Coast SPA as a result of disturbance during installation and removal activities.

b: Disturbance during operation and maintenance activities of the marine cable - There is the potential for noise and the physical presence of personnel required for the maintenance of the marine cable up to MHWS at East Pickard Bay to result in temporary and short-term disturbance to breeding chough features of the SPA as the chough out-with the SPA site boundary, these animals are likely to be considered as part of the SPA breeding population. Therefore, **no potential for LSE cannot be concluded** for chough features of the Castlemartin Coast SPA as a result of disturbance during operation and maintenance activities.

c: Habitat fragmentation and severance during installation and removal activities - For the reasons outlined above for a), there is *no potential for LSE* for chough features of the Castlemartin Coast SPA as a result of habitat fragmentation and severance during marine cable installation and removal activities up to MHWS.

d: Habitat fragmentation and severance onshore operation and maintenance activities - For the reasons outlined above for b), **no potential for LSE cannot be concluded** for chough features of the Castlemartin Coast SPA as a result of habitat fragmentation and severance during operation and maintenance activities up to MHWS.

e: Temporary displacement of species during marine cable installation and removal activities - For the reasons outlined above for a), there is *no potential for LSE* for chough features of the Castlemartin Coast SPA as a result of temporary displacement during installation and removal activities associated with the marine cable.

f: Temporary displacement of species during marine cable operation and maintenance activities - For the reasons outlined above for a), there is *no potential for LSE* for chough features of the Castlemartin Coast SPA as a result of temporary displacement during operation and maintenance activities associated with the marine cable.

g: Accidental release of pollutants across all phases of the META Project – There is no receptor-impact pathway and therefore there is *no potential for LSE* for chough features of the Castlemartin Coast SPA as a result of the accidental release of pollutants during offshore activities.

h: In-combination effects onshore construction and removal activities of the META Project - On the basis that all impacts associated with the META Project installation and removal phases have been screened out of further assessment for chough, it is considered that activities associated with planned projects or other activities in the vicinity of the META Project *have no potential for LSE* to chough features of the Castlemartin Coast SPA as a result of in-combination effects during the installation and retrieval phases of the project. Activities associated with planned projects or other activities in the vicinity of the META Project **do however have the potential to result in LSE** to chough as a result of in-combination effects during the operation and maintenance phase of the project.

5 Summary

Table 5.1 summarise the European Sites that are proposed to be taken forward to appropriate assessment as it cannot be concluded that there is no potential for LSE. These sites will be considered in a report to inform appropriate assessment (RIAA) that will be provided to the competent authority (CA) as part of the application process for the META Phase 2 project.

Table 5.1: Summary of European sites screened in for further assessment in report to inform appropriate assessment (RIAA), and associated relevant qualifying interest feature(s).

European Site screened in to RIAA	Relevant Qualifying Interest Feature(s)
Pembrokeshire Marine/Sir Benfro Forol SAC	Large shallow inlets and bays
	Estuaries
	Reefs
	Mud-flats and sand-flats not covered by seawater at low tide
	Coastal lagoons
	Submerged or partially submerged sea caves
	Sandbanks which are slightly covered by seawater all the time
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
	Twaite shad
	Allis shad
	Sea lamprey
	River lamprey
	Grey seal
	Otter
Limestone Coast of South West Wales SAC	Submerged or partially submerged sea caves
Afonydd Cleddau/ Cleddau Rivers SAC	Sea lamprey
	River lamprey
	Otter
West Wales Marine/Gorllewin Cymru Forol cSAC	Harbour porpoise
Cardigan Bay/ Bae Ceredigion SAC	Grey seal
Bristol Channel Approaches cSAC/ Dynesfeydd Môr Hafren MPA	Harbour porpoise
Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA	Atlantic puffin
	European Storm Petrel
	Lesser black-backed gull
	Manx shearwater
	Razorbill
	Common guillemot
	Black-legged kittiwake
Pembrokeshire Bat Sites and Bosherston Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC	Otter
Castlemartin Coast SPA	Chough

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MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 2 : Email correspondence with NRW Advisory Services

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status

Version	Date	Authored by	Reviewed by	Approved by	Review date
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue

Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

Sent: 22 May 2019 17:59
Subject: RE: META marine mammal query

Hi Ruth,

Following our chat earlier, our advice on the use of marine mammal management units in the HRA process is that the relevant marine mammal management unit (MU) is used as the spatial scale for screening sites. If potential impact pathways are identified for a marine mammal Annex II feature, then all sites with that feature within the relevant MU for that species should be screened in for assessment. If LSE cannot conclusively be ruled out then all the sites in the relevant MU should be taken forward to appropriate assessment.

I have attached a PDF of the harbour porpoise marine mammal management unit and the relevant SACs within it for consideration in your screening. We also have similar maps for the grey seal and bottlenose dolphin MUs if you require them.

At the appropriate assessment stage, we would recommend the following approaches for the marine mammal features:

Harbour porpoise – Assess the impacts on the site closest to the proposed plan or project location. Use those conclusions to assess the remaining sites. If the assessment concludes an AEOI for the closest site, the next closest site should then be considered. It is possible that AEOI could be ruled out at more distant sites due to the decreased chance of animals from further way being impacted. This will, however, be considered on a case by case basis.

Bottlenose dolphin – Carry out an appropriate assessment on both Welsh sites. The high level of connectivity between sites, and the strong evidence that there is a single population of bottlenose dolphins using both sites means that it is likely that an AEOI on one site would also occur on the other. **I note your comment below that BND have been screened out – if I remember rightly that is because the META site falls outside of the Irish sea bottlenose dolphin management unit? If that's the case then that's fine*.

Grey seal - Pembrokeshire Marine SAC is the key site which supports most grey seal pupping within the Celtic and Irish Seas part of the OSPAR Region III area (interim management unit), yet other areas may be more important as non-breeding haul-outs. Grey seals are therefore a more complex feature to assess, and AA should be conducted on a case by case basis but is likely to require an assessment against each of the welsh SACs.

I hope that helps, if you have any further questions just let us know

Best regards

Ceri

Ceri Wyn Morris
Arbenigwr Mamaliaid Môr / Marine Mammal Specialist
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 4913 / 07766248402

Maes y Ffynnon, Bangor
Siaradwr Cymraeg

Sent: 22 May 2019 12:22
Subject: RE: META marine mammal query

Hi Ceri.
Thanks for our quick call to discuss the MMMU Harbour Porpoise SACs query we had.

As discussed, if you could send through the list of Harbour Porpoise SACs within the MMMU and the extracts from the draft NRW guidance, that would be great.
To summarise our discussion, NRW wish all SACs within the relevant harbour porpoise MMMU to be considered within the META HRA, but consider it likely that most will not require full Appropriate Assessment and that it is most likely that West Wales Marine SAC, Bristol Channel Approaches SAC, and North Anglesey Marine SAC will be taken forwards to full AA.

To confirm, bottlenose dolphin have been screened out for Cardigan Bay SAC due to lack of evidence of connectivity of bottlenose dolphin with the Milford Haven Waterway and surrounding waters as follows – i.e. no potential for LSE due to lack of route to impact (text taken from the META HRA screening report:

Bottlenose dolphin are highly mobile animals and forage over large areas. Whilst there is understood to be connectivity between the bottlenose dolphin populations of the Cardigan Bay SAC and the Lleyn Peninsula SAC (NRW, 2017b), there is no evidence for connectivity with the Cardigan Bay SAC and the Waterway. For example, the marine mammals surveys undertaken off Pembrokeshire in support of the Marine Renewable Energy Strategic Framework (MRESF) recorded only a single sighting of a bottlenose dolphin offshore of the Bishops and Clerks islands, off Ramsey Sound (RPS, 2011). Furthermore, there are no records of this species occurring within the Waterway on the NBN gateway. It can therefore be concluded that there is no potential for LSE for Annex II bottlenose dolphin features of the Cardigan Bay SAC as a result of any of the impacts associated with any phase of the META Project.

Grey seals have been screened in for further consideration for Cardigan Bay.

I look forward to receiving the list of Harbour Porpoise SACs and the guidance extracts.

Regards,
Ruth

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MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 3: Pembrokeshire Marine SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status

Version	Date	Authored by	Reviewed by	Approved by	Review date
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue

Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

5 Conservation Objectives

This latest version of the Regulation 37 package has been revised to improve accessibility of conservation objectives and to update the legislative context. The intent of the conservation objectives and of the advice on operations which may cause deterioration or disturbance to the feature is the same as in previous versions. The Conservation Objectives are now shorter and more generic but there has been no change in what is considered to represent Favourable Conservation Status.

In order to meet the aims of the Habitats Directive, the conservation objectives seek to maintain (or restore) the habitat and species features, as a whole, at (or to) favourable conservation status (FCS) within the site.

The Vision Statement is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives into a single, integrated statement about the site.

5.1 Vision statement for Pembrokeshire Marine

Our vision for the Pembrokeshire Marine Special Area of Conservation (SAC) is one of a high quality marine environment, where the protected habitats and species of the site are in a condition as good as or better than when the site was selected; where human activities co-exist in harmony with the habitats and species of the site and where use of the marine environment is undertaken sustainably

5.2 Conservation objectives for the Pembrokeshire Marine Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Sandbanks which are slightly covered by seawater all the time
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Coastal lagoons
- Large shallow inlets and bays
- Reefs
- Submerged or partially submerged sea caves
- Atlantic salt meadows

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **inlets and bays** feature these include;

- The embayment of St. Brides Bay
- The ria of Milford Haven
- Peripheral embayments and inlets

For the coastal lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structure and maintenance of the lagoons for the original purpose or subsequent purpose that pre-dates classification of the site.

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for:

Nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the feature species populations, their abundance or range.

<u>Restoration and recovery</u>

As part of this objective it should be noted that; **the Milford Haven waterway complex** would benefit from restorative action, for example through the removal of non-natural beach material, and the removal, replacement or improved maintenance of rock filled gabions. There is also need for some restoration of the populations of several typical species of the Milford Haven waterway complex that are severely depleted with respect to historical levels as a consequence primarily of human exploitation.

In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

For the lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structures of **coastal lagoons** and maintenance of the **lagoons** for their original purpose or subsequent purpose that pre-dates classification of the site.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness,
- population structure and dynamics,
- physiological health,
- reproductive capacity,
- recruitment,
- mobility,
- range.

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery

For the **inlets and bays** features this includes the need for some restoration of the populations of several typical species which are severely depleted with respect to historical levels as a consequence primarily of human exploitation.

In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

5.2.5 Species Features

- Grey Seal *Halichoeurus grypus*
- Otter *Lutra lutra*
- Allis shad *Alosa alosa*
- Twaite shad *Alosa fallax*
- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*
- Shore dock *Rumex rupestris*

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size

- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **otter** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal and otter,** populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **otter** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
  Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour
- For **otter** there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

Restoration and recovery
In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

As part of this objective it should be noted that for the **otter,** populations should be increasing.

5.3 Understanding the Conservation Objectives

5.3.1 A dynamic marine environment

The conservation objectives recognise and acknowledge that the features are part of a complex, dynamic, multi-dimensional environment. The structures, functions (environmental processes) and species populations of habitat features are inextricably linked. Marine habitats are complex ecological webs of species, habitat structure and environmental functions that vary dynamically in time and space. Variety and change in habitat structure are primarily driven by environmental and physicochemical factors, including water movement, water quality, sediment supply and prevailing weather conditions.

The species populations associated with these habitats also vary in time and space and this is, in part, a direct reflection of the variable habitat structure and dynamic environment. It is also the product of stochastic events and the great variation in survival and recruitment of species, particularly those with dispersive reproductive strategies.

Within the dynamism of habitats and species, there is also an element of stability and persistence, where species' and communities' populations as well as physical habitat structure show little overall long-term variation.

5.3.2 Human activities

These conservation objectives recognise and acknowledge that human activity has already modified and continues to modify habitats and species populations in various ways, to varying degrees and at varying spatial and temporal scales, either acutely or chronically. The conservation objectives do not aim to prevent all change to the habitat and species features, or to achieve an indefinable, abstract natural or pristine state, since these would be unrealistic and unattainable aspirations. Rather, they seek to prevent further negative modification of the extent, structure and function of natural habitats and species' populations by human activity and to ensure that degradation and damage to the features that is attributable to human activities or actions is prevented. Consequently, in order to meet the requirements of the Directive and ensure the site makes its appropriate contribution to conservation of biodiversity, the conservation objectives seek to:

- Encompass inherent dynamism rather than to work against it;
- Safeguard features and natural processes from those impacts of human activity that cause damage to the features through the degradation of their range, extent, structure, function or typical species;
- Facilitate, where necessary, restoration of features or components of features that are currently damaged or degraded and in unfavourable condition.

The term *degradation* is used to encompass damage or deterioration resulting only from such human activities or actions as have a detrimental effect on the feature. The

magnitude of any degradation is dependent on the longevity and scale of the impact and the conservation importance of the species or habitats on which the impact occurs. This is influenced by:

- the type of human action, its nature, location, timing, frequency, duration and intensity;
- the species or habitats, and their intolerance and recoverability.

Outcomes arising from human action that are likely to be considered detrimental include such effects such as:

- permanent and long-term change of distribution or reduction in extent of a feature or feature component, or temporary modification or reduction sufficiently significant to negatively impact on biota or ecological processes;
- reduction in ecological function caused by loss, reduction or modification of habitat structural integrity;
- interference in or restriction of the range, variety or dynamism of structural, functional or ecological processes, *e.g.*: alteration of habitat structure, obstruction of tidal streams, chronic or acute thermal, salinity or suspended sediment elevations or reductions;
- hypertrophication or eutrophication;
- contamination by biologically deleterious substances;
- reduction in structure, function and abundance of species populations;
- change in reproductive capacity, success or recruitment of species populations;
- reduction in feeding opportunities of species populations
- reduction of health to a sub-optimal level, or injury, rendering the population less fit for, *inter alia,* breeding, foraging, social behaviour, or more susceptible to disease;
- increase in abundance and range of opportunist species through the unnatural generation of preferential conditions (*e.g.* organic enrichment), at the expense of existing species and communities.
- increase in abundance and range of non-native species.

Table 2 provides illustrative examples of specific changes and whether they would constitute degradation of the feature.

It is important to note that many human activities can either be beneficial (reduce or reverse detrimental human influence (*e.g.* improve water quality)), trivial (*e.g.* no significant and/or substantive long-term effect) or benign (no outcome) in terms of their impact on marine habitats and species.

Advice on potentially detrimental human activities is provided in Section 6 (activities or operations which may cause damage or disturbance to features).

Table 2: Examples of change and whether they would constitute degradation of the feature.

Degradation	Not Degradation
Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by high tissue burdens of anthropogenically derived contaminants.	Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by density dependent incidence of endemic disease.
Modification of a seabed community by organically rich effluent from a new sewage outfall.	Modification of a seabed community as a result of a reduction in organic material entering the sea from a sewage outfall.
Change in seabed community composition as a result of coastal engineering that has altered local wave exposure.	Change in seabed community composition as a result of a cliff fall, the debris from which has altered local wave exposure.
Change to the species composition of a seabed community as a result of an increase in scallop dredging intensity.	Change to the composition of a seabed community as a result of a reduction in scallop dredging intensity.
Permanent reduction of extent of sand and mud-flat as a result of new coastal development.	Permanent reduction of extent of sand and mud-flat as a result of long-term natural changes in sediment transport.
Changes in sediment granulometry as a result of beach recharge operations	Changes in sediment granulometry as a result of natural cliff fall and erosion

5.3.3 Use of the conservation objectives – Site management

The components of favourable conservation status detailed in the conservation objectives have different sensitivities and vulnerabilities to degradation by human activities. Conservation and protection of site features is provided by management, which should be based on levels of risk. The form of management and degree of protection necessary will vary spatially, temporally and from one feature component to another due to their differences in conservation importance and their sensitivity and susceptibility to change as a result of human action. Therefore it needs to be understood that these conservation objectives require a risk-based approach to the identification, prioritisation and implementation of management action.

Security of management is provided in part 6, sections 59 to 66, of the Conservation of habitats and Species Regulations 2017, which require the assessment of plans and projects likely to have a significant effect on the site.

Where there is a potential for a plan or project to undermine the achievement of the conservation objectives, NRW will consider the plan/project to be likely to have a significant effect and require appropriate assessment. Unless it is ascertained, following an appropriate assessment, that a plan or project will not undermine the achievement of the conservation objectives, the plan/project should be considered as having an adverse effect on the integrity of the site[89].

Appropriate and secure management of activities may also be provided through a site management plan.

[89] Uncertainity should not result in a conclusion of no adverse effect on site integrity.

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 4: Limestone Coast of South West Wales SAC Conservation Objectives

EOR0730

Marine Energy Test Area

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4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

a. Outline of the legal context and purpose of conservation objectives.

Conservation objectives are required by the 1992 'Habitats' Directive (92/43/EEC). The aim of the Habitats Directives is the maintenance, or where appropriate the restoration of the 'favourable conservation status' of habitats and species features for which SACs and SPAs are designated (see Box 1).

In the broadest terms, 'favourable conservation status' means a feature is in satisfactory condition and all the things needed to keep it that way are in place for the foreseeable future. CCW considers that the concept of favourable conservation status provides a practical and legally robust basis for conservation objectives for Natura 2000 and Ramsar sites.

Box 1
Favourable conservation as defined in Articles 1(e) and 1(i) of the Habitats Directive

"The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

Achieving these objectives requires appropriate management and the control of factors that may cause deterioration of habitats or significant disturbance to species.

As well as the overall function of communication, Conservation objectives have a number of specific roles:

- Conservation planning and management.

  The conservation objectives guide management of sites, to maintain or restore the habitats and species in favourable condition.

- Assessing plans and projects.

  Article 6(3) of the 'Habitats' Directive requires appropriate assessment of proposed plans and projects against a site's conservation objectives. Subject to certain exceptions, plans or projects may not proceed unless it is established that they will not adversely affect the integrity of sites. This role for testing plans and projects also applies to the review of existing decisions and consents.

- Monitoring and reporting.

  The conservation objectives provide the basis for assessing the condition of a feature and the status of factors that affect it. CCW uses 'performance indicators' within the conservation objectives, as the basis for monitoring and reporting. Performance indicators are selected to provide useful information about the condition of a feature and the factors that affect it.

The conservation objectives in this document reflect CCW's current information and understanding of the site and its features and their importance in an international context. The conservation objectives are subject to review by CCW in light of new knowledge.

b. Format of the conservation objectives

There is one conservation objective for each feature listed in part 3. Each conservation objective is a composite statement representing a site-specific description of what is considered to be the favourable conservation status of the feature. These statements apply to a whole feature as it occurs within the whole plan area, although section 3.2 sets out their relevance to individual management units.

Each conservation objective consists of the following two elements:
1. Vision for the feature
2. Performance indicators

As a result of the general practice developed and agreed within the UK Conservation Agencies, conservation objectives include performance indicators, the selection of which should be informed by JNCC guidance on Common Standards Monitoring[1].

There is a critical need for clarity over the role of performance indicators within the conservation objectives. **A conservation objective, because it includes the vision for the feature, has meaning and substance independently of the performance indicators, and is more than the sum of the performance indicators**. The performance indicators are simply what make the conservation objectives measurable, and are thus part of, not a substitute for, the conservation objectives. Any feature attribute identified in the performance indicators should be represented in the vision for the feature, but not all elements of the vision for the feature will necessarily have corresponding performance indicators.

As well as describing the aspirations for the condition of the feature, the Vision section of each conservation objective contains a statement that the factors necessary to maintain those desired conditions are under control. Subject to technical, practical and resource constraints, factors which have an important influence on the condition of the feature are identified in the performance indicators.

[1] Web link: http://www.jncc.gov.uk/page-2199

4.1 Conservation Objective for Feature 1: Vegetated sea cliffs of the Atlantic and Baltic coasts

Vision for Vegetated sea cliffs of the Atlantic and Baltic coasts

The vegetated sea cliffs feature comprises a number of component habitats as described below. All of these must be in favourable conservation for the feature as a whole to be considered to be in favourable conservation status.

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

Cliff and crevice vegetation continues to form a very open cover of deep-rooted crevice dwelling species forming a narrow band along the steep cliff edges. On their seaward edges the cliff and crevice communities grade into the supralittoral lichen zone. Landwards they meet the maritime grassland and thereophyte communities which themselves intermingle with the maritime heaths. Both golden samphire and rock sea lavenders are typically associated with crevices and ledges and continue to be generally widespread where open and exposed conditions prevail.

The maritime grasslands range from short open swards with occasional areas of bare ground to taller, more closed swards where Red Fescue (*Festuca rubra*) forms tussocks and "mattresses". The more strongly maritime influenced grassland communities on this site, for the most part, occur on the exposed south and south westerly facing slopes.

Elsewhere, in less exposed situations the grasslands show less maritime influence with species such as Cowslips *(Primula veris)* and Bluebells *(Hyacinthoides non-scripta)* occurring. The grasslands also support important populations of typical invertebrates such as ants and butterflies as well as insects associated with open soils, grass roots or dung such as various cranefly and beetle larvae.

Maritime heath occurs in exposed locations as stands of low, wind-pruned heath dominated by heather *(Calluna vulgaris)* and bell heather *(Erica cinerea).* Species such as spring squill (*Scilla verna),* milkworts (*Polygala spp*.) pale dog violet (*Viola lactea*) and sedges (*Carex spp.)* are present in stands. This gives way to gorse-dominated dry heath (feature 3) in more sheltered areas.

- Cliff and crevice vegetation occurs naturally on suitably exposed rocky ledges and crevices throughout the site. The variety of vegetation types reflecting the degree of exposure to maritime influences - including communities with thrift, rock and golden samphires, sea lavenders, sea-beet and sea plantain.
- Maritime Grassland occupies approximately 15% of the total site area.
- The following plants are common in the maritime grassland: thrift *Armeria maritima;* spring squill *Scilla verna* and sea plantain *Plantago maritime.*
- Maritime Heathland occupies approximately 10% of the total site area.
- The following plants are common in the maritime heathland: heather *Calluna vulgaris*; bell heather *Erica cinerea* and spring squill *Scilla verna*.
- Populations of nationally rare and nationally scarce vascular and lower plant species, associated with cliff-crevice, maritime grassland and related calcareous grassland swards are maintained.
- Competitive species indicative of under-grazing, particularly cocksfoot *Dactylis glomerata,* tor grass *Brachypodium pinnatum,* bracken *Pteridium aquilinum* and western gorse *Ulex gallii* are kept in check.
- Non-native plants such as Hottentot fig *Carpobotus edulis are* absent or rare.

Performance indicators for Vegetated sea cliffs of the Atlantic and Baltic coasts
The performance indicators are <u>part of</u> the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Habitat extent and distribution	Habitat extent and distribution is provisional. Documents used for establishing habitat extent and distribution have relied on: Castlemartin Range and Penally Range ILMPs; Stackpole SSSI digital maps (non NVC habitat maps) plus Cooper (Lancaster Univ., 1987) NVC vegetation maps of British Sea cliffs and cliff-tops; Castlemartin Range Phase II vegetation maps (Phase II grassland survey team, 2004); and Davies and Wilson (2000). Digitised habitat maps, based on latest Phase II survey methods, are reasonably complete for Castlemartin Cliffs and Dunes SSSI. For the other component SSSI, maritime grassland and heath habitats have been mapped for some sites but not necessarily to latest digital mapping standards. In the case of management units 4 and 5a to 5c these sections have yet to be properly mapped.	<u>**Pembrokeshire sections**</u> *Upper limit*: None set *Lower limit*: **Cliff crevice communities** Are present at suitable locations scattered throughout management units 2b to 2g, 3c, 4 & 5a to 5c. **Sea bird ledge communities** Are present at Pen-y-holt Stack (management unit 2c), Elegug Stacks management unit 2e), St. Govan's Head (management unit 2g) and Stackpole Head (management unit 3c). **Maritime grassland** There is approximately 140 ha of maritime grassland (c.100 ha of which are within management units 2b to 2g; 25 ha are in unit 3c, and the remainder in units 4 and 5a to 5e). **Maritime heath** There is approximately 100 ha of maritime heath, mostly within management units 2b to 2g, with a small amount (c. 5 ha) in unit 3c. <u>NB</u> figures for extent and distribution are provisional limits, based on incomplete data (as mapped by Phase II grassland team for Castlemartin); Davies & Wilson and other sources. <u>**Gower sections**</u> *Upper limit* none set as will be constrained by natural factors *Lower limit* 42ha as extent in survey of 2003 Where Cliff ledge & crevice communities = 25ha Coastal grassland = 14ha Maritime heath = 3ha Present in units 6,9 and 10

A2. Habitat condition	Based on the Standard CSM attribute for this feature. Modified according to site-specific requirements. Good condition maritime grassland will generally occur on more exposed cliffs and coastal slopes with south or westerly aspects within each unit.	**<u>Pembrokeshire sections</u>** *Upper limit*: none set *Lower limit*: Cliff & crevice vegetation is characterised by vegetation where within a 2m radius of sample points: • At least two of the following positive indicator species are present; *Inula crithmoides, Beta vulgaris, Armeria maritima, Asplenium marinum, Aster tripolium, Cochlearia officinalis, Crithmum maritimum, Limonium* spp, *Plantago maritima, Plantago coronopus, Spergularia rupicola,* growing from crevices in hard maritime cliffs. • Invasive non-native plant species are absent or rare if already present Sea bird ledge community is characterised by the presence of: • *Lavatera arborea* and *Tripleurospermum maritimum* Invasive non-native plant species are absent or rare if already present At least 50% of the maritime grassland in management units 2b to 2g, 3c, 4 (Barafundle–Stackpole Quay section only), 5b, 5d & 5e is referable to good condition maritime grassland **AND** At least 50% of the maritime heath in management units 2b to 2g and 3c is referable to good condition maritime grassland maritime heath Good condition maritime grassland is characterised by vegetation where, within a 50cm radius: • There is one or more of *Plantago maritima*, *Scilla verna, Festuca rubra* and /or *Armeria maritima* • The sward is <3cm in height Good condition maritime heath is characterised by vegetation where, within a 1m radius: At least **3** of the following are present *Scilla verna, Armeria maritima, Plantago maritima, P. coronopus, Anthylis vulneraria,*

		Hypochaeris radicata, Lotus corniculatus, Polygala vulgaris, P. serpyllifolia, Thymus praecox, Potentilla erecta, Serratula tinctoria, Viola riviniana, V. lactea, Anthoxanthum odoratum, Carex spp., Danthonia decumbens, Dactylohriza maculata, Aira praecox and Cladonia spp. of lichen. • Dwarf shrubs have a cover of 25-75%, with at least **2** species present. • *Ulex* species < 50% cover • Indicators of negative change, non-native species and scrub or trees are absent • Bare ground or early successional vegetation should occupy at least 400 cm^2 (20x20cm) but not cover more than 25% of the sample. **Gower sections** Cliff and crevice communities limits as above Maritime grassland As limits above though presence of positive indicator species also to include *Crithmum maritimum, Inula crithmoides, Spergularia rupicola, Catapodium marinum*
A3. Population size and distribution of rare and scarce plants	A number of nationally rare and nationally scarce species, mentioned in the overall site selection details, are associated with the vegetated sea cliff habitats. These include: Wild asparagus *Asparagus officinalis* subs *prostatus,* small restharrow *Ononis reclinata,* goldlocks aster *Aster linosyris* and scrambled egg lichen *Fulgensia fulgens.* The populations of these and other scarce species have all been fairly well studied and mapped. Records are in stored in Recorder and as Mapinfo files. Other	*Upper limit*: None set *Lower limit*: *Asparagus officinalis* subs *prostatus* is present in at least 12 mapped locations in cliff-top grassland within Lydstep to Tenby Burrows SSSI (management unit 5e). *Ononis reclinata* is present is present in mapped locations along south-facing crevice zones, near the cliff-tops within Castlemartin Cliffs and Dunes SSSI (management units 2g); Stackpole SSSI (units 3b); Stackpole Quay to Trewent Point SSSI (unit 4); Lydstep to Tenby ows SSSI (units 5b to 5e). In Gower it is present at Overton Cliff (unit 20). *Aster linosyris* is present in mapped zones in cliff-top grassland within Castlemartin

	summary information to aid future surveillance and monitoring are in Castlemartin Range and Penally Range ILMPs.	Cliffs and Dunes SSSI (management units 2c, 2d and 2f). In Gower it is present at Port Eynon Point (unit 17) and Overton Cliffs (unit 20) *Fulgensia fulgens* is present in mapped zones associated with *Trichosporum* moss on compact, free-draining, shallow, calcareous grassland soils within Castlemartin Cliffs and Dunes SSSI (management units 2a to 2e); Stackpole SSSI (units 3b, 3c, 3d and 3f). *Draba aizoides* is present in units 9-17 and 20 and should not fall below 75% of population shown in 1995 counts *Helianthemum canum* is present in units 9, 10, and 12-20 and should not fall below 50% of population at 1995 counts
Performance indicators for factors affecting the feature		
Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Livestock grazing	The more exposed, seaward areas of maritime grasslands and heathlands are, like the cliff and crevice communities, maintained by 'natural' environmental factors – including exposure to salt spray, thin soils and climatic extremes. Further away from the cliff edges, the heathland vegetation has been maintained by traditional grazing practices. Without an appropriate grazing regime, it would become rank and turn to gorse scrub. Maintenance of current traditional practice of winter sheep and cattle grazing, and additional light cattle and or pony grazing throughout year, is key to maintaining these areas. Chough (SPA feature 11) require short maritime turf for feeding purposes, so their requirements must be accommodated within structural component provided by grazing animals within management units 2a to 3f. Dung from grazing animals also provides an important invertebrate food source.	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure and cause significant bare areas to appear, or lead to nutrient enrichment (indicated by increases in creeping thistles and/or nettles). (Limits of acceptable bare areas set out in A2. above.) The grazing pressure must not be so high as to break down the vegetation structure *Lower limit*: Maritime grasslands and heathlands must be subject to sufficient grazing to halt succession. The chough population is being maintained in favourable condition (see feature 11)
F2. Burning	Where possible, fire-breaks should	*Upper limit*: no burning of maritime

	be considered to control spread of fire in key heath areas. Maintenance of grazing is essential help reduce fire risk. The location of new accidental fires should be mapped each year – using GPS to record locations as stored waypoints – down-loaded to GIS to record extent.	heath, maritime grassland and cliff & crevice vegetation. The location of new accidental fires should be mapped each year – using GPS to record locations as stored waypoints – down-loaded to GIS to record extent. *Lower limit*: none set
F3. Pollution	Airborne pollutants such as nitrous oxides from vehicle exhausts could affect the feature. There is potential for this feature to be impacted by agricultural activities such as fertiliser application on adjoining land. Oil spills and nutrient enrichment could pose potential threats to components of the community complex. Seabird numbers can be affected by natural factors (e.g. food supply) and by oil pollution, which could potentially affect the extent or the condition of the seabird cliff vegetation community.	*Upper limit*: levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance. *Lower limit*: none set
F4. Military activity (scrapes erosion)	A number of localised scrapes created in the past by the MoD for military training purposes, on the fringe of the Castlemartin Cliffs and Dunes SSSI, has lead to the recreation of young heath. In most places where this has been done, it has resulted in more diverse heathland habitat, supporting scarce species. Such methods need to be considered on a rotational basis but there is a need to take careful consideration of other features. There is also a potential for localised excessive erosion of community types caused by over-intensive military use, or through deposition of extraneous materials.	*Upper limit*: Military activities should not cause fragmentation or reduce the extent of communities. Habitat quality should not be affected (see individual feature condition objectives) *Lower limit*: None set
F5. Access and Recreation	Increased pressure for wider ranging outdoor activity – e.g. from cliff-climbing - could pose potential threats to components of	*Upper limit*: Regular group activities such cliff scrambling/climbing should be kept under seasonal review, within an existing network of agreed voluntary climbing

	the community complex (e.g. seabird cliff ledge communities and cliff-crevice communities) by trampling/erosion.	restrictions. *Lower limit*: None set
F6. Natural Processes and other Factors	The introduction or spread of highly invasive or alien plants could pose a threat to maritime cliff and crevice communities.	*Upper limit*: Potentially invasive alien cotoneaster shrubs at Lydstep quarries should be managed to eradicate if possible, or at least reduce their extent by at least 50% to prevent the likelihood of further spread into semi-natural habitats. *Lower limit*: None set

4.2 Conservation Objective for Feature 2: Fixed dunes with herbaceous vegetation ("grey dunes") 2130

Vision for fixed dunes
The dune complex at Broomhill Burrows, Broadhaven South and Barafundle Bay will demonstrate a fairly complete sequence from fore dunes fringed on the seaward edge by narrow bands of mobile dune, through to fixed dune grassland. There will be small blow-out patches of bare sand and fore-dune and strandline. Elsewhere in the SAC, the perched dunes (such as at Stackpole Warren) may not show this zonation from fore dune to fixed dune but should none-the-less have some blowouts and areas of bare sand.

- Fixed dunes occupy approximately 20% of the total site area.
- The following plants will be common in a short, open sward: *Asperula cyanchica,Carlina vulgaris, Euphrasia spp., Gentianella amarella, Linum catharticum, Lotus corniculatus, Pilosella officinarum, Plantago coronopus, Sedum acre, Thymus polytrichus, Viola spp., Anacamptis pyramidalis.*
- Distinct patches of open, lichen-rich turf, supporting *Fulgensia fulgens* on *Trichosporum* moss will occur in several mapped locations in management units 2a, 2b, 3b and 3c.
- Alien species will be absent, and other negative indicator species (such as bracken *Pteridium aquilinum)* will be under control in fixed dune grassland.
- Sea Buckthorn *Hippophae rhamnoides* will be absent from all dunes systems within the SAC.

Note: This feature is not present within the Gower sections of the SAC

Performance indicators for fixed dunes
The performance indicators are <u>part of</u> the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Habitat extent and distribution	Habitat extent and distribution is provisional. Documents used for establishing habitat extent and distribution have relied on: Castlemartin Range and Penally Range ILMPs; Stackpole SSSI vegetation maps (e.g. Ashall, Duckworth, Holder and Smart (1994), Sand Dune survey of GB (NVC); Castlemartin and Penally Ranges NVC maps, ITE (1999); updated by Phase II vegetation maps (Phase II grassland survey team, 2004). NB. The 1994 NVC dune survey was not based on digital data. At Broomhill Burrows, Castlemartin (Brownslade and Linney Burrows) Stackpole warren (management units 1a to 1c, 2a and 2b, and 3b and 3d) dune habitats were not mapped very	*Upper limit*: None set *Lower limit*: No net decrease in extent from the established baseline, subject to natural change. NB extent is estimated to be approx 200 ha, based on limited data. Fixed and semi-fixed dune grassland will be present in management units 1a to 1c, 2a and 2b, 3b and 3d.

	accurately. ITE produced a slightly more accurate map, for management units 2a, 2b in 1999. This map was updated by the 2004 CCW Phase II grassland survey team.	

A.2 Habitat Condition	Based on the Standard CSM attribute for this feature. Modified according to site-specific requirements. Record within 0.5 metre radius at points, within a grid, at 10 metre intervals (paced). Ideally record a minimum of 50 points. Choose areas of habitat on/close to the boundary between the target community and transitional communities. Vegetation height (boreman disk method) 7 cms or less = pass. If chough feeding is important at a chosen location, 70% of points should be 3 cms or less; Evidence of rabbit activities (pellets and scuffing) should be noted.	*Upper limit*: None set *Lower limit:* Dune vegetation in management units 1a to 1c, 2a and 2b, 3b and 3d is in good condition when 70% of points in the sample zone pass – based on the following criteria: 30-70% of the sward comprises a species-rich short turf. **Species Rich dune grassland (= SD8):** Six of the following species (pass on five spp., if the vegetation height is 7 cms or less): Asperula cyanchica Carlina vulgaris, Cerastium (not fontanum) Euphrasia spp. (agg.), Gentianella amarella Linum catharticum, Lotus corniculatus, Pilosella officinarum, Plantago coronopus Thymus polytrichus Viola spp., **Bare sand/semi fixed dunes (= SD19 and/or CG7d):** Bare sand >5% or moss and lichen cover >20% plus three of the following: Arenaria, Centuary or Blackstonia, Cerastium (not fontanum), Echium vulgare, Erodium, Euphorbia portlandica, Fulgensia fulgens, Sedum acre Thymus polytrichus Viola spp. *Anacamptis pyramidalis* Non-native or invasive species, including *Hippophae rhamnoides, Hypericum calycinum and Brachypodium pinnatum* are absent. Other negative indicators *Rubus* spp. (excluding *R.caesius), Clematis vitalba, Pinus* spp. saplings/seedlings, *Ligustrum vulgare, Quercus ilex* saplings/seedlings, *Ulex* spp. no more than occasional; *Pteridium aquilinum* no more than occasional with a open/thin cover and height <50 cms.

A.3 Population size and distribution of *Fulgensia fulgens* lichen sites	*Fulgensis fulgens* is a rare terricolous lichen on the Limestone soils. Population distribution and extent of this distinctive species have been mapped in GIS. Most recent surveillance information is reported in Wolseley and James (2004), Castlemartin Range ILMP (2006 update). Further fieldwork, to establish appropriate attributes for future condition assessments, was undertaken by a lower plant specialist contractor in autumn 2007. A report is not yet available.	*Upper limit:* None set *Lower limit:* Distinct patches of open, turf, supporting healthy populations *Fulgensia fulgens* on *Trichosporum* moss will occur in 5 mapped dune/calcareous grassland locations (management units 2a, 2b) and in at least 12 mapped dune/calcareous grassland locations in units 3b and 3d and 3f. (Additional information awaited in contractors report).
A.4 Condition of *Fulgensia* sites	A lichen specialist contractors report, based on 2007 fieldwork is awaited. This should provide the rationale and recommended attributes for monitoring the future condition of the *Fulgensia* populations within the SAC.	Limits to be set when contractors report received.
Performance indicators for factors affecting the feature		
Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Livestock grazing	The more exposed, seaward areas of dune grassland are maintained by 'natural' environmental factors – including wind erosion, exposure to salt spray, thin skeletal soils and climatic extremes. Further away from the cliff edges, the dune grassland has been maintained by traditional grazing practices. Without an appropriate grazing regime, it would become rank and turn to scrub. Maintenance of current traditional practice of winter sheep and cattle grazing, and additional light cattle and or pony grazing throughout year, is key to maintaining these areas. Chough (SPA feature 11) require short dune turf for feeding purposes, so their requirements must be accommodated within structural component provided by grazing animals within management units 2a to 3f.	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure or lead to nutrient enrichment (indicated by increases in creeping thistles and/or nettles). *Lower limit*: The fixed dune grassland must be subject to sufficient grazing to halt succession to scrub.

	Dung from grazing animals also provides an important invertebrate food source Maintenance of semi-native rabbit population is also important to maintain an open structure – including small areas of scuffing and scraping which are beneficial	
F2. Burning	Drier parts of the dunes are potentially vulnerable to accidental burns – e.g. from military ordnance, although such fires would normally be expected to be limited to semi-fixed dune and fore-dune (e.g. drier marram-dominated areas). Dune fires could lead to serious erosion of the dune vegetation impacting fixed and semi-fixed dune habitats.	*Upper limit*: Accidental burns from military activities on the firing ranges, affecting no more than 2 to 3% of the semi-fixed dunes and fore dunes per year, are acceptable *Lower limit*: none set
F3. Pollution	Airborne pollutants such as nitrous oxides from vehicle exhausts could affect the dune grassland. Potential for this feature to be impacted by agricultural activities such as fertiliser application on adjoining land.	*Upper limit*: levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance *Lower limit*: none set
F4. Military activity	A potential for localised excessive erosion of community types caused by intensive military use, or deposition of extraneous materials.	*Upper limit*: Military activities should not cause fragmentation or reduce the extent of communities. Areas around key *Fulgensia* sites within Castlemartin Range management units should be identified on sensitive area maps, marked and signed on the ground. These should be regularly inspected to minimise potential damage by military training activities. *Lower limit*: None set
F5. Access and Recreation	Increased pressure for wider ranging outdoor activity - e.g. from outdoor group-oriented parties, use of 4wd vehicles etc could pose potential threats to components of the community complex, by trampling/erosion and possibly burning.	*Upper limit*: Regular and/or large-scale group activities should be prevented. **AND** No vehicles should be taken on to the dunes, where authorised vehicles are permitted (e.g. military vehicle) these should use designated tracks/routes through dune vegetation. *Lower limit*: None set
F6. Natural Processes and other Factors	Potential threats from: decline in rabbit numbers; spread of invasive species (e.g. tor grass), which may be unpalatable to grazing stock and could detrimentally affect community diversity.	*Upper limit*: No commercial sand quarrying to be allowed. *Lower limit*: Some creation of bare areas in dune slacks will need to be maintained for feature 8 Petalwort

	Some 10% of the dunes have been quarried in the past. Whilst this has created elements of diversification within the dune communities and has benefited invertebrate, bird and plant diversity further commercial quarrying would be damaging to the dunes.	*(Petalophyllum ralfsii)* populations

4.3 Conservation Objective for Feature 3: European Dry Heath (4030)

Vision for Dry Heath
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The current extent of Dry heath will be maintained.
- Dry heath will occupy areas of the site where heathland extends beyond the zone of maritime influence.
- As a result dry heath may lack the species characteristic of maritime heath.
- Much of the dry heath will have a short and open structure.
- The dry heaths will support typical species such as the dark green fritillary *(Argynnis aglaja)* and the silver studded blue butterfly, *Plebeius argus*.

Performance indicators for Dry Heath
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Habitat extent and distribution	Maps of habitat extent and distribution given in: Davies E.J., (2000) Wilson S., (2000)	*Upper limit*: As limited by other feature habitats. Any increases in heath should be at the expense of stands of bracken or scrub. *Lower limit*: Current extent and distribution maintained as mapped by Davies E.J., (2000) and Wilson S., (2000) Gower section maintained at the current extent of 69ha
A2. Habitat condition	Based on the Standard CSM attribute for this feature. Modified according to site-specific requirements	All sections *Upper limit*: None set *Lower limit*: At least 60% of the dry heath in management units 2b to 2g is referable to good condition dry heath.

		Good condition dry heath is characterised by vegetation where at each sample point: • Dwarf shrubs have a cover of 25-75%, with at least **2** species present (*Calluna vulgaris Erica cinerea, Ulex gallii)* • *Ulex gallii* (in some places with low growing *Ulex europaeus)* making up < 50% of the dwarf Shrub cover • Grass cover less than 50% • Short, open vegetation structure with a canopy height >15cm and < 50cm, otherwise very rank *Ulex* and associated scrub will develop • at least one 10x10cm patch of bare ground, moss or lichen • Bracken and scrub other than *Ulex spp*, if present, are no more than occasional to frequent **Gower sections only (units** , 9, 10, 15, 17, 19 and 20)Also include Frequency of grasses and sedges *Upper limit* • 3 of the following species are present *Festuca ovina, F. rubra, Carex flacca, Agrostis capillaries, Hypochaeris radicata* • *Lower limit*1 of the above species Frequency of forbs *Upper limit* : None set *Lower limit* • 4 of the following at least occasional *Lotus corniculatus, Helianthemum numularia, Plantago lanceolata, Gallium verum, Sanguisorba minor, Potentilla erecta, Scilla verna, Armeria maritima*
Performance indicators for factors affecting the feature		
Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Livestock grazing/mowing	Away from the cliff edges, dry heathland vegetation has been maintained by traditional grazing practices. Without an appropriate grazing regime, it would become rank and turn to gorse scrub. Light grazing by animals, ideally cattle in summer, or ponies throughout the year, is key to maintaining these	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure and cause significant bare areas to appear. (Limits of acceptable bare areas set out in A3. above.) *Lower limit*: The dry heathland must be subject to sufficient grazing to halt succession.

	areas. Excessive cutting or mowing of heath could reduce its overall structural diversity and quality.	Refer to limits identified in A2
F2. Burning	Irregular, accidental and uncontrolled fires occur in most years, affecting sections of dry heath and scrub within Castlemartin Range management units. Whilst this can maintain heath in some areas and may benefit some species such as silver-studded blue butterflies, excessive heath burns could be damaging over a long-term period, leading to nutrient enrichment, a reduction in heath and an increase in grass or bracken dominance and scrub dominance.	*Upper limit*: no deliberate burning management is to be undertaken, but in any accidental burns, no more than 10% of dry heathland to be burnt in six-year period. *Lower limit*: none set
F3. Pollution	Airborne pollutants such as nitrous oxides from vehicle exhausts could affect the feature. There is potential for this feature to be impacted by agricultural activities such as fertiliser application on adjoining land.	*Upper limit*: levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance *Lower limit*: none set
F4. Military activity	Excessive erosion by military activities - e.g. changes in target, bunker, road or radar locations - and associated build up of extraneous materials, could potentially cause localised damage.	*Upper limit*: Military activities should not cause fragmentation or reduce the extent of communities. Habitat quality should not be affected (see individual feature condition objectives) *Lower limit*: None set
F5. Access and Recreation	Currently no significant factors are thought to apply.	*Upper limit*: Regular and/or large-scale group activities should be prevented (apart from climbing under currently agreed climbing restrictions). *Lower limit*: None set
F6. Natural Processes and other Factors	The introduction or spread of highly invasive species could pose a threat to these communities.	*Upper limit*: Invasive and/or alien plant species should be rare or absent *Lower limit*: None set

4.4 Conservation Objective for Feature 4: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) / Dry grasslands and scrublands on chalk or limestone 6210

Vision for Semi-natural dry grasslands and scrubland
This feature

- The Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) / Dry grasslands and scrublands on chalk or limestone will be referable to the NVC communities Festuca – Avenula grassland (CG2) and *Festuca – Hieracium – Thymus* grasslands (CG7)
- The communities making up this feature will cover at least 14 ha within Castlemartin Cliffs and Dunes SSSI) and 10 ha within Stackpole and Stackpole Quay to Trewent Point SSSI, and 18 ha within the Gower Coast SSSI (which also includes NVC community CG1) occurring as small patches along coastal cliff-tops, among the fixed dune grasslands, mainly on shallow soils overlying areas of limestone bedrock.
- The feature will support a range of typical plant and invertebrate species.

Performance indicators for semi-natural dry grasslands and scrubland
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Habitat extent and distribution	The aim is to ensure that the extent and distribution of the calcareous grassland feature across the coast of South West Wales. To ensure this, a target has been included that states that all SSSI within this SAC, that contain this feature, have to be in good condition for this SAC feature to be considered favourable overall. *Broomhill Burrows* None present at Broomhill – the calcareous grassland there is on sand and is incorporated into fixed due grassland feature. *CastlemartinCliffs and Dunes* Mapped by the Phase II team in 2004. Various communities and sub-communities present. *Stackpole and Stackpole Quay to Trewent Point* Mapped in 1978 (pre-NVC) and later using NVC (although the earlier maps are a better reflection of the vegetation). At Stackpole there is some confusion as to whether the habitat is sand dune or	*Upper limit*: None set *Lower limit*: As mapped (refer to individual SSSI habitat maps for further information) Distributed within management units 2b to 2g, 3a to 3d and 3f and 4, 9,10, 12-20

	calcareous grassland. *Lydstep to Tenby Burrows* None present at Lydstep to Tenby Burrows – only CG grassland present is CG1f which lies within the VSC habitat *Gower Coast : Rhossilli to Port Eynon, Pwlldu Head, Oxwich Bay* 18 ha within Gower Coast SSSI (check other sections)	
A.2 Habitat quality	There has been some surveillance of calcareous grassland at Stackpole SSSI – (e.g. Rich et al 1990), but performance indicators for feature condition are provisional, because there has been no recent monitoring of this feature (based on the CSM method) within the component SSSI in Pembrokeshire.	*Upper limit*: None set *Lower limit*: The individual site based performance indicators are met for each of the following SSSI: *Castlemartin Cliffs and Dunes* (14ha) distributed within management units 2b to 2g; *Stackpole and Stackpole Quay to Trewent Point* (10ha) within management units 3a, 3b, 3c, 3d and 3f and 4 *Gower Coast: Rhossili, Pwlldu Head and Oxwich* At least 70% of the feature are referable to good condition CG2 or CG7 vegetation and CG1d on Gower sections only Where, at each sample point: • The grass: herb ratio is between 30-90% herb cover • Agricultural weeds are no more than occasional throughout the sward • Agriculturally favoured species have a frequency of <10% including *Lolium perenne, Cirsium arvense, Cirsium vulgare, Urtica dioica, and Senecio jacobaea* • Coarse grasses have a cover < 10% • No introduced species is more than occasional throughout the sward • Woody species and bracken

		together < 5% cover • Short to medium sward height < 5cms • Litter < 25% cover • Bare ground <10% Small patches of CG2 grassland will occur widely throughout the site with short-herb- rich swards and charactersistic plants including at least 5 from: kidney vetch *Anthyllis vulneraria,* quaking-grass *Briza media*, salad burnet S*anguisorba minor,* squinancywort *Asperula cynanchica,* birdsfoot trefoil *Lotus corniculatus,* wild thyme *Thymus polytrichus*, Knapweed *Centaurea nigra,* cowslip *Primula veris, milwort Polygala* spp., devils-bit scabious *Succisa pratensis,* mouse-eared hawkweed *Pilosella officinarum,* rough hawbit *Leontodon hispidus,* lesser hawkbit *L. saxatilis,* betony *Stachys officinalis* Small patches of CG7 grassland, with fescue grasses *Festuca rubra* or *F. ovina* will be low-growing and open, with moss and lichen cover, plus at least 5 from: Hair grass species *Aira spp*., parsley-piert species *Aphanes spp.,* common centaury *Centaurium erythraea,* common storksbill *Erodium cicutarium,* rough hawbit *Leontodon hispidus,* birdsfoot trefoil *Lotus corniculatus,* mouse-eared hawkweed *Pilosella officinarum,* wild thyme *Thymus polytrichus.* Gower sections also to include presence of *Helianthemum sp (nummularium or canum), Euphrasia sp, Koelaria macrantha, Carex flacca, Geraneum sanguineum, and Arabis hirsuta*
Performance indicators for factors affecting the feature		
F1. Livestock grazing	Further away from the cliff edges, the dune grassland has been maintained by traditional grazing practices. Without an appropriate grazing regime, it would become rank and turn to scrub. Maintenance of current traditional practice of winter sheep and cattle	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure and cause significant bare areas to appear or lead to nutrient enrichment. *Lower limit*: These communities must be subject to sufficient grazing to halt

	grazing, and additional light cattle and or pony grazing throughout year, is key to maintaining these areas. Chough (SPA feature 11) require short dune turf for feeding purposes, so their requirements must be accommodated within structural component provided by grazing animals within management units 2a to 3f. Dung from grazing animals also provides an important invertebrate food source Maintenance of semi-native rabbit population is also important to maintain an open structure – including small areas of scuffing and scraping which are beneficial An additional effect of over-stocking of livestock in units 9 and 12 is supplementary feeding by commoners. It is important to prevent this by ensuring livestock numbers are kept at an appropriate level. Refer to the Gower Coast SSSI management plan for specific details of this.	succession. Refer to limits in A2 above
F2. Burning	Any burning of adjacent heath vegetation as part of controlled management should avoid these grassland communities	*Upper limit*: No burning to take place on these grasslands Lower limit: none set
F3. Pollution	Airborne pollutants such as nitrous oxides from vehicle exhausts could affect the feature. There is potential for this feature to be impacted by agricultural activities such as fertiliser application on adjoining land.	*Upper limit*: levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance Lower limit: none set
F4. Military activity	Excessive erosion by military activities - e.g. changes in target, bunker, road or radar locations - and associated build up of extraneous materials, could cause localised damage.	*Upper limit*: Military activities should not cause fragmentation or reduce the extent of communities. Habitat quality should not be affected (see individual feature condition objectives) *Lower limit*: Maintain current marked, and signed exclusion zones to military vehicles in areas within Castlemartin Range management units 2a and 2b.
F5. Access and Recreation	Excessive trampling and camping/camp fires could be damaging and lead to erosion of open vegetation communities and localized nutrient enrichment	*Upper limit*: Regular and/or large-scale group activities should be prevented *Lower limit*: None Set
F6. Natural Processes and other Factors	The introduction or spread of highly invasive species could pose a threat to these communities.	*Upper limit*: *Lower limit*: None set

4.5 Conservation Objective for Feature 5: Caves not open to the public

Vision for caves not open to the public
These caves continue to be primarily of importance as bat hibernacula and roost sites. Their performance indicators are expressed in terms of their suitability as bat hibernacula/roost sites. The performance indicators are those given in Wilkinson, K. (2006). Monitoring report: Greater horseshoe bats of the Limestone Coast of South West Wales SAC. CCW Internal document. Choughs continue to breed high in the roofs of several caves.

- There is minimal disturbance to the caves by the public
- The caves remain suitable as bat roost/hibernation sites
- Caves utilised by breeding choughs remain undisturbed for choughs (see Feature 11)
- The geological interest of the caves will be unconcealed
- Natural processes such as small rock falls will be tolerated

Performance indicators caves not open to the public
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent and distribution of bats	Based upon the performance indicators set out in Wilkinson (2006) (See Feature 7)	*Upper limit*: None set Lower limit: The 'greater horseshoe bats feature of the Limestone Coast of South West Wales' is described as favourable (See Feature 7)
A2. Extent and distribution of chough nest sites in caves	(See Feature 11)	*Upper limit*: None set Lower limit: Choughs are found nesting in the roofs of caves at: Wind Bay Linney Head The Castle (Also see Feature 11)
A3. Condition of caves	Based upon the performance indicators set out in Wilkinson (2006)	*Upper limit*: None set *Lower limit*: The roosts identified in the greater horseshoe bat feature-monitoring project are described as favourable. Choughs regularly fledge young from at least three caves (See Features 7 and 11)
Performance indicators for factors affecting the feature		
F1. Access and Recreation	The caves are currently accessible to climbers and water users	*Upper limit*: No public access allowed Lower limit: None set

F2. Natural Processes and other Factors		*Upper limit*: Natural factors such as small rock falls that do not significantly affect the bat roosts and chough nest sites will be tolerated. Tidal activity should have a minimum disruption upon the internal environment of the cave. *Lower limit*: No subsidence or crumbling of the cave. The cave should be structurally sound.

4.6 Conservation Objective for Feature 6*:* Submerged or partially submerged sea caves

Vision for Submerged or partially submerged sea caves
These features are cross-boundary features between the Limestone Coast SAC and the Pembrokeshire Marine SAC. Other than prevention of human disturbance to both the caves themselves and any species which may be using them (mainly bats and grey seals), there is little management required or indeed possible for this feature.

- There should be minimal disturbance to the caves and they should remain closed to the public.
- The caves should remain suitable as bat roost/hibernation sites
- The caves used by grey seal should remain free of human disturbance
- The geological interest of the caves will be unconcealed
- Natural processes such as small rock falls will be tolerated
- The affects of tidal activity in partially submerged caves should have a minimal effect on the internal environment of the cave (where the cave is a bat roost).

Performance indicators Submerged or partially submerged sea caves
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent and distribution	The caves will exist as determined by natural processes, no management is required or indeed possible. The distribution of caves is poorly understood and it is possible that more caves will be discovered in time. Natural loss of sea caves may take place through rock fall as the cave entrances may become blocked. Such natural events will have to be tolerated, though any human blockage of entrances through any adjacent development will not.	*Upper limit*: None set *Lower limit*: As current distribution of the caves
A2. Condition of caves	Other than ensuring that the caves remain free of human disturbance both direct through physical damage, and indirect through pollution and litter, there is little management of this feature that is either necessary or possible. No limits have been set for this.	
Performance indicators for factors affecting the feature		
F1. Access and Recreation	The caves are currently accessible to climbers and water users	*Upper limit*: No public access allowed *Lower limit*: None set

4.7 Conservation Objective for Feature 7*:* 1304 Greater horseshoe bat *Rhinolophus ferrumequinum*

Vision for Greater horseshoe bat *Rhinolophus ferrumequinum*

- Greater horseshoe bats will continue to utilise known caves roosts undisturbed by the public.
- Distinctive droppings indicate presence at any time of year but largest numbers of bats are likely to be found in the period November to March.
- The peak winter population in the main Castlemartin Cave is equivalent to approximately 20% of the Pembrokeshire Bat Sites and Bosherston lakes SAC greater horseshoe bat population.
- The greater horseshoe bat population within the caves being monitored is stable or increasing.
- Natural processes such as rock falls will be tolerated but other factors affecting the achievement of these conditions are under control.

Performance indicators Greater horseshoe bat *Rhinolophus ferrumequinum*

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent and distribution of greater horseshoe bats	Greater and lesser horseshoe bats roost within a number of caves along the limestone within Pembrokeshire and on Gower. There are good surveillance data for a few of well-recorded sites, but for other caves data are limited. Billington (2004) being the most recent bat worker to survey them. Some bat caves best fit "caves not open to the public" - e.g. "Ogof Govan" perched above the sea on Saddle Head, on the Castlemartin coast. But as the entrances of many are at least partially flooded at high water, they best fit marine caves partially submerged at high water. Such a cave supports the largest known winter roost for greater horseshoe bats in Wales, with up to 200-300 bats present at times. This cave has large amounts of flotsam/jetsam strewn over its boulder floor and can only be visited by humans on low water spring tides. The bats can roost high up in its domed-roof if they need to. We don't know how the bats access this and other similar caves, if they need to when the entrance available	*Upper limit*: None set *Lower limit*: There is evidence of greater horseshoe bats in sea caves and caves not open to the public, known to support them: Castlemartin/Stackpole - management units 2c to 2g, 3a and 3c: There is evidence, in at least 1 out of 6 years[2], of use by greater horseshoe bats in at least 11 caves out of 21 caves identified by Billington (2004). This should include Castlemartin Cave (Bullslaughter Bay Bat Cave -Cave 149), Ogof Govan (Cave 319) and Trevallen Cave (Cave 104) plus eight out of Billingtons Caves 16, 17, 22, 50, 66, 80, 86, 122, 145, 146, 148, 151, 153, 155, 161, 178, 182 and 225. Lydstep to Penally – management units 5a to 5e: There is evidence of use by greater horseshoe bats in one of caves 196 or 302 (Lydstep coast) and in at least 2 caves from 266, 297, 312 and 313 on

[2] Ideally it would be good to survey all these caves every year but this is likely to be disturbing to the bats and expensive to undertake. It has been agreed that this work should be undertaken one year in six, to tie in with the report cycle. However, these caves will be surveyed more frequently if there are any serious problems identified at maternity or hibernation roosts thought to be associated with these caves.

	to humans is flooded. The cave numbering system follows that used by Billington (2004) except along the Gower section where local cave names are used. See section 5.5 for definitions of terms used here. For several reasons, it is difficult to set targets for the number of bats to be present within the coastal caves, both in terms of total population and in terms of targets for individual caves. Firstly, we are only beginning to understand how and when the bats use some of these caves so it is difficult to time any survey work to actually see bats in the caves. Secondly, the bats tend to be found in lower numbers during the winter, in a larger number of locations. This makes searching for them more difficult. Therefore it is not easy to accurately determine how many bats are using the caves. Instead the performance indicators only require evidence of use by greater horseshoes. This can be the presence of a greater horseshoe bat or presence of greater horseshoe bat droppings; fortunately in areas where they are not washed away by the sea, these are easy to distinguish from droppings of other species. The obvious exception to this is the main cave roost Castlemartin Cave (Cave 149) where, when present, bats can usually be seen quite easily. The bats can roost in dense clusters. These are not easy to count without causing disturbance. Two other historically important key roosts, Trevallen Cave and Ogof Govan are also highlighted in the performance indicators. In addition to this, evidence of use by greater horseshoe bats is required in eight other potentially significant caves from a large list of sites identified by Billington, along the Linney Head to Stackpole Quay section, plus two caves within the Lydstep section and two out of four caves within the Penally section.	the Penally coast. Gower - management units 9: There is evidence of use by greater horseshoe bats in Bacon Hole at least every other year **AND** In either: Deborah's Hole, Longhole or Mewslade (cave 1) every other year.

	Targets have been included for Gower. There are data from the 1980s indicating that the caves listed have been used by very small numbers of bats (1or 2 in each instance), other than Bacon Hole where higher numbers of bats have been recorded (maximum of 16). Targets have been set to reflect this level of use.	
A2. Population in the core area	Within the main greater horseshoe bat cave (Castlemartin Cave) large numbers of bats can be viewable throughout the winter months. Their numbers do fluctuate (as indicated by surveillance data gathered by local bat worker Tom McOwtat), however the peak level reached in winter is usually not less than approximately 100 bats between November and March. When assessing this site, it is essential to bear in mind that bats using Castlemartin Cave are most likely to be linked to the Stackpole Courtyard Flats maternity roost. If the autumn/winter weather is mild, it is possible that the bats will remain at the maternity roost. It is recommended that the Stackpole site is checked the same day if the number of bats at Castlemartin Cave is lower than the target.	*Upper limit*: None set *Lower limit*: In management unit 2f (within the main Castlemartin Bat Cave (Bullslaughter Bay Cave[3] - Cave 149) the peak population of greater horseshoe bats (present between November and March) is at least approx *20% of the Pembrokeshire Bat Sites and Bosherston lakes SAC population – based on not more than 3 widely spaced visits per season to count the bats. **Based on recent counts, this should be approx 200 bats.*
Performance indicators for factors affecting the feature		
F1. Condition of caves	The condition of the caves should be assessed using the Common Standards Monitoring guidance for hibernation sites (JNCC, 2004). These were not available to Billington, who surveyed the caves in winter 2002/03 so he developed his own methods to record suitability of the caves as bat roosts and stability (Billington, 2004).	*Upper limit*: None set *Lower limit:* Using criteria described by Billington (2004) caves known to support bats remain highly suitable for bats and stable
F2. Access and Recreation	The caves are currently accessible to climbers, cavers and water users. Disturbance to bats is very difficult to quantify. However, current level of disturbance in most caves on the Castlemartin peninsula, and between Lydstep and Penally, is thought likely to be low. However, as the number of people participating in outdoor activities such as	*Upper limit*: No public access allowed Lower limit: None set

[3] Castlemartin Cave is referred to as Bullslaughter Bay Cave and as cave number 149 in Billington (2004).

	rock climbing, coasteering and caving increases, it is possible that the amount of disturbance to the bats could increase. Communications with climbing/caving groups is being developed to prevent this from becoming a problem.	

4.8 Conservation Objective for Feature 8*:* Petalwort *Petalophyllum ralfsii*

Vision for Petalwort *Petalophyllum ralfsii*

Petalophyllum ralfsii will continue to be found at two SSSI sand dune systems within the SAC, (Broomhill Burrows & Brownslade Burrows). The Brownslade Burrows population will occur patchily at high densities in successionally young, open vegetation in damp, dune slacks.

- *P. ralfsii* has a continued presence at Broomhill Burrows SSSI.
- *P. ralfsii* occurs at high densities in suitable dune slacks at Brownslade Burrows SSSI.
- At both sites there are areas of open, damp, calcareous dune slacks with patches of suitable and optimal habitat present.
- Suitable dune slacks have patches of bare ground that is being colonised by jelly lichens (*Collema* spp.) and *Barbula* mosses.
- Brownslade Burrows continues to be winter grazed by cattle and sheep, which is helping to maintain the short sward and open conditions required by *P. ralfsii.*

Note: This feature is not present within Gower sections of the SAC

Performance indicators for Petalwort *Petalophyllum ralfsii*

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Distribution and population size	Based upon performance indicators in the draft monitoring report for Petalwort *Petalophyllum ralfsii* in the Limestone Coast SAC, Wilkinson (2004).	*Upper limit*: None set *Lower limit:* >50 thalli are present per m^2 at more than 3 discrete locations (separated by at least 10m) in a minimum of three of the mapped areas A-H (see map below). **AND** *Petalophyllum ralfsii* continues to be present at Broomhill Burrows
A2. Habitat condition	Based upon habitat descriptions in the draft monitoring report for Petalwort *Petalophyllum ralfsii* in the Limestone Coast SAC, Wilkinson (2004). Optimal *Petalophyllum* habitat: Vegetation where within a 25cm radius: Higher plant cover is <50% and combined cover of *Collema* spp./*Barbula* spp. is >25% Potentially suitable *Petalophyllum* habitat: Vegetation where within a 25cm radius: Higher plant cover is <50% and *Collema* spp./*Barbula* spp. are present but have a cover of <25%	*Upper limit*: None set *Lower limit*: *Petalophyllum ralfsii* at Brownslade will be in favourable condition when: • 40% of the vegetation is referable to optimal *Petalophyllum* habitat or potentially suitable *Petalophyllum* habitat, • A minimum of 10% of the potentially suitable habitat is referable to optimal *Petalophyllum* habitat • *Petalophyllum* is associated with the optimal/potentially suitable habitat • Non-native/alien species absent

Performance indicators for factors affecting the feature		
F1. Livestock grazing/mowing	The dune slack communities are maintained by traditional grazing practices. Without an appropriate grazing regime, they would become rank and turn to gorse scrub. Light grazing key to maintaining these areas. Excessive cutting or mowing of the grasslands could reduce their overall structural diversity and quality.	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure and cause significant bare areas to appear. (Limits of acceptable bare areas set out in A2. above.) *Lower limit*: These communities must be subject to sufficient grazing to halt succession.
F2. Burning	Sand dunes are particularly vulnerable to accidental burns from picnickers, beach users and barbeques. The loss of vegetation cover could rapidly lead to serious erosion of the dune system.	*Upper limit*: No burning to take place in the petalwort dune slacks. Lower limit: none set
F3. Pollution	Airborne pollutants such as nitrous oxides from vehicle exhausts could affect the dune grasslands and slacks. The dune slacks could potentially be impacted by agricultural activities such as fertiliser application on adjoining land.	*Upper limit*: Levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance Lower limit: none set
F4. Military activity	A potential for localised excessive erosion of community types caused by intensive military use, or deposition of extraneous materials.	*Upper limit*: Military activities should not cause fragmentation or reduce the extent of communities. Habitat quality should not be affected (see individual feature condition objectives) *Lower limit*: None set
F5. Access and Recreation	Increased pressure for wider ranging outdoor activity - e.g. from orienteering/coast-steering and cliff-climbing - could pose potential threats to components of the community complex, by trampling/erosion.	*Upper limit*: Regular and/or large-scale group activities should be prevented. *Lower limit*: None set
F6. Natural Processes and other Factors	Potential threats from: decline in rabbit numbers; spread of invasive species (e.g. tor grass), which may be unpalatable to grazing stock and could detrimentally affect community diversity. Some 10% of the dunes have been quarried in the past. Whilst this has created elements of diversification within the dune communities and has benefited invertebrate, bird and plant diversity further commercial quarrying would be damaging to the dunes.	*Upper limit*: No commercial sand quarrying to be allowed *Lower limit*: Some creation of bare areas in dune slacks will need to be maintained for Petalwort *(Petalophyllum ralfsii)* populations

4.9 Conservation Objective for Feature 9*:* Early gentian (*Gentianella anglica)* 1654

Vision for Early gentian (*Gentianella anglica)*

- The feature will be present at Stackpole in management unit 3d.
- Dune gentians with three or fewer internodes and a long terminal internode, which contributes between 40-100% of the height of the stem (corresponding to the current definition/description of Early gentian *Gentianella anglica*) occur within at least 4 open dry dune slacks on Stackpole Warren and in other open, herb-rich calcareous grassland areas.
- Further survey/research will confirm that these forms are definitely separable from *Gentianella amarella*

Note: This feature is not present within Gower sections of the SAC

Performance indicators for Early gentian (*Gentianella anglica)*
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Species extent and distribution	[1] *G.anglica* is to be identified using the criteria outlined in Rich *et al* 1997. The performance indicator simply requires a presence of gentians showing the criteria outlined in this paper. However Rich suggests that it is more advisable to look at a larger number of samples and calculate the mean values for the characteristics listed, the average figure providing more confidence that the plants are indeed *G.anglica*. The limits set enable us to ensure that the current known distribution at Stackpole is maintained. Currently there is only a small amount of information about the extent, distribution and density of this species. It is recommended that further surveillance is undertaken for the next five years. The performance indicators should then be reviewed. An additional target requiring that *G. anglica* is found in association with the areas of good habitat (optimal Gentianella habitat) rather than along side footpaths and tracks, which may provide suitable growing condition (a short, open sward) but populations in these locations are not likely to viable in the long term.	*Upper limit*: None set *Lower limit*: *Gentianella anglica'* type plants are found in *Stackpole SSSI Unit 3d* within previously mapped areas A-D on Stackpole Warren. *Gentianella anglica* type plants will be found in association with "optimal" *Gentianella* habitat (see attribute A2) ***Gentianella anglica* type plants:** Dune gentians generally with three or fewer internodes and a long terminal internode which contributes between 40-100% of the height of the stem[1]
A2. Habitat extent and quality	At Stackpole, *G. anglica* is thought to be associated with what are described as 'dry slacks'. More specifically it is found within areas of successionally young dune vegetation within these slacks. The targets	*Upper limit*: None set *Lower limit*: Within each of dry slacks A-D, 50% of

	within the performance indicator table should reflect this. Four key 'dry slack' have been identified, locations A-D. These locations generally reflect where *G. anglica* has been known to occur in the past. Each of these 'dry slacks' is required to contain a proportion of optimal *G. anglica* habitat (i.e. successionally young vegetation). Indicator species chosen are indicative of these younger, more open conditions. Within each of areas A-D bracken and scrub encroachment is a potential problem, therefore these species have been included as negative indicators.	the vegetation is referable to "optimal" *Gentianella* habitat. **Optimal *Gentianella* habitat:** Within a 50cm radius of each sample point, 6 or more of the following are present: *Thymus polytrichus*, *Plantago coronopus*, *Sedum acre*, *Viola spp*., *Cerastium spp*. (not *fontanum*), *Euphrasia spp*., *Linum catharticum*, *Centaurium erythraea*, *Carlina vulgaris*, *Euphorbia portlandica*, *Asperula cynanchica*, *Blackstonia perfoliata* **AND** *Pteridium aquilinum*, *Rosa pimpinellifolia*, *Rubus spp*. will be absent and cover of *Festuca spp./Agrostis spp*. is less than 25% **AND** The combined cover of bare sand and acrocarpus mosses is >5%
Performance indicators for factors affecting the feature		
F1. Livestock grazing/mowing	Further away from the cliff edges, the dune grassland has been maintained by traditional grazing practices. Without an appropriate grazing regime, it would become rank and turn to scrub. Maintenance of current traditional practice of winter sheep and cattle grazing, and additional light cattle and or pony grazing throughout year, is key to maintaining these areas. Maintenance of semi-native rabbit population is also important to maintain an open structure – including small areas of scuffing and scraping which are beneficial	*Upper limit*: Maintain very short fairly open turf, with numerous herbs. The grazing pressure must not be so high as to break down the vegetation structure and cause nutrient enrichment and/or bare areas to appear. (Indicator species of optimal open conditions and negative indicators of under-grazed conditions are set out in A2. above.) *Lower limit*: These communities must be subject to sufficient grazing to halt succession.

F2. Bracken and scrub encroachment	Scrub and bracken is a potential threat to the open grassland communities. A warmer climate with milder, winters and declines in the semi-natural rabbit population may be allowing patches of gorse and other scrub to advance in areas where grazing pressures previously kept in check. Bracken encroaching the fringes of *Gentianella* habitat should be managed by bruising or cutting in preference to chemical control. It should be noted that small patches of scrub and bracken may form natural calcareous coastal scrub communities and so should not be managed unless their spread is considered a threat to *Gentianella* habitat and other key features that have no other suitable areas to naturally move into.	*Upper limit*: *Pteridium aquilinum*, *Rosa pimpinellifolia*, *Rubus spp*. are absent Cover of *Festuca spp./Agrostis spp*. is less than 10%. Lower limit: *Pteridium aquilinum*, *Rosa pimpinellifolia*, *Rubus* spp should be open structure and restricted to the fringes of the Genianella sites. Cover of *Festuca spp./Agrostis spp*. is less than 25%.
F3. Pollution	The feature could be affected by airborne pollutants such as nitrous oxides from vehicle exhausts	*Upper limit*: Levels of pollutants must not exceed critical thresholds for vegetation types according to JNCC guidance *Lower limit*: None set
F4. Access and Recreation	Currently no significant factors are thought to apply.	*Upper limit*: None set Lower limit: None set
F5. Natural Processes and other Factors	A total collapse and loss of the rabbit population could enable scrub and other coarse vegetation communities to become established at the expense of optimal *Gentianella* habitat The introduction or spread of highly invasive species could pose a threat to these communities.	*Upper limit*: As for scrub/bracken management *Lower limit*: As for scrub/bracken management

4.10 Conservation Objective for : Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hyodryas*) *aurinia*)

Vision for marsh fritillary butterfly

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- A healthy metapopulation of marsh fritillary butterflies is present within Castlemartin Cliffs and Dunes SSSI component of the SAC, extending over some 5km along the coast.
- The population is maintaining itself and, although perhaps cyclically affected by a parasitic wasp, it is secure within at least two core areas and occasionally is also found breeding outside the SAC boundary on in-land areas of Castlemartin Range.
- There is sufficient suitable and good condition habitat to support the meta-population of the butterfly which is dependent here on mainly herb-rich coastal limestone grassland, with large patches/swathes of the caterpillar's main food-plant, devil's bit scabious *Succisa pratensis* bordered by coastal heath and scrub.
- The sward will vary in height so that there are short 'lawn' areas for the caterpillars to sun themselves on (including numerous yellow ant *Lasius flavus* hills) and taller tussocky, or open sparse bracken areas to provide shelter.

Note:Not found within Gower sections of the SAC

Performance indicators for Marsh Fritillary

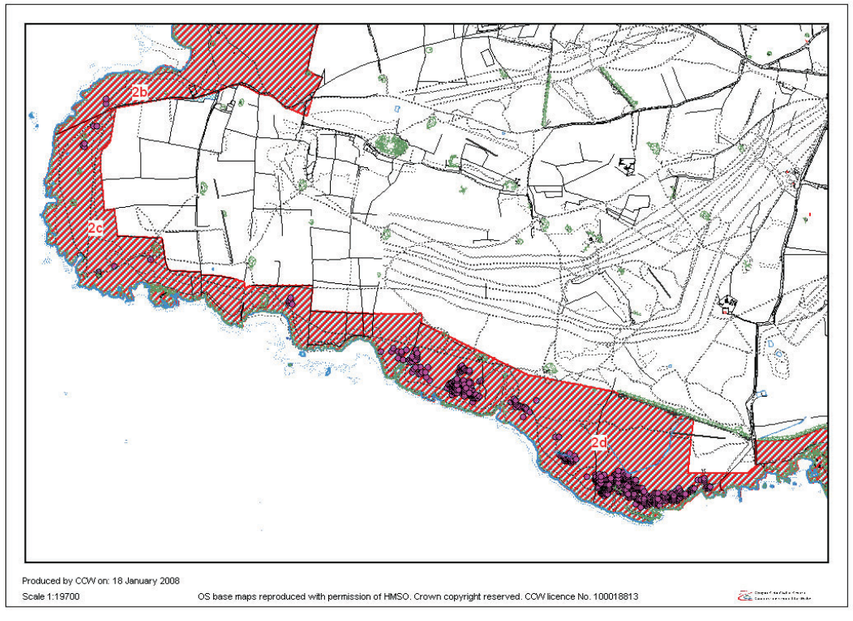
The performance indicators are <u>part of</u> the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Population size - larval webs	A total of 250 larval webs per hectare should be present in good condition habitat, one year in 6. The targets set are provisional, based on limited surveillance since discovery of the population in 2003 (Haycock, 2005). The marsh fritillary population has been expanding since then. A survey in autumn 2006, by members of the South Pembrokeshire Ranges Recording and Advisory Group (SPRRAG) plotted larval web distribution and extent utilising GPS to record their locations. More than 2,000 webs were found in management units 2b, 2c and 2d, across approx 5 kms of coastal habitat. Highest web densities were recorded between Buliber Down and the Wash, within unit 2d, roughly corresponding with the core area for butterflies recorded between late May and 11th June 2006.	*Upper limit*: None set *Lower limit*: 70 larval webs per hectare of optimal breeding habitat within the core population area between Buliber Down and the Wash within management unit 2d.

	Even here the larval web density was probably no more than an average of 70-100 per ha across c. 50 hectares of reasonably good habitat. GPS should be used to record web locations as waypoints uploaded to GIS to confirm population extent and distribution.	
A2. Population size - adults	When on the wing adult marsh fritillary butterflies are very obvious and numbers locally can be quite dense, with many nectaring and mating in potentially suitable habitat. Between 2004 and 2007 timed counts, between the end of May and early June, have yielded >1,000 butterflies within a core area of management unit 2d (Buliber Down to the Wash) Such counts provide a fairly quick and simple means of determining the distribution and extent of the core population. This not only helps determine breeding success (based on last seasons larval web counts) but also helps focus on key areas to undertake later season larval web counts to determine overall seasonal trends. During such counts, observations of other local species (such as small-pear-bordered fritillary and dingy skipper) can also be collected. Marsh fritillary butterflies should be counted along approx. W-shape walks through suitable habitat over c.20 minute periods. GPS should be used to record locations as waypoints uploaded to GIS to confirm population extent and distribution.	*Upper limit*: None set *Lower limit*: At least 150 marsh fritillary butterflies should be counted in each of three 20 minute timed-counts (along short transects between late May and early June) within the core population area between Buliber Down and the Wash within management unit 2d.
A3. Population distribution	Targets have also been set to ensure that the distribution of the marsh fritillary across the site is maintained, and that the butterflies are not simply concentrated in the 'core' area. Further surveillance data are required over a number of years.	*Upper limit*: None set *Lower limit*: Marsh fritillary larval webs should be found within Castlemartin Range West across management units 2b, 2c and 2d **and** Marsh fritillary butterflies should be seen in the same units plus in Range East management unit 2e, one year in six.

A4. Extent of breeding habitat	Based on base-line marsh fritillary "habitat quality" transects established within the Castlemartin Range in September 2003 and re-surveyed in April 2004 (Howells, 2005). S*uccissa* grows extensively within parts of Range West (management units 2b, 2c 2d) and also within parts of Range East (management units 2e to 2g). The whole Range is subjected to quite extensive winter grazing by several thousand sheep and a few hundred cattle - typically between November and early May. Grazing pressure, plus exposure of some of the coast to salt-laiden winter storms usually reduces the coastal grassland vegetation height (over quite a wide area) to <5cms by about April, when the caterpillars are emerging to feed and wandering away from webs prior to pupation. The provisional lower limits have been set to try and reflect this fairly typical, "normal" condition. Further surveillance data are required over a number of years.	*Upper limit:* As limited by other feature habitats *Lower limit:* • There are at least approx 100ha of suitable habitat on the site (essentially in management units 2b, 2c, 2d and 2e) • At least 50ha of the suitable habitat is "Good Condition Marsh Fritillary Habitat" Suitable Marsh Fritillary Habitat is: • Grassland where *Succisa pratensis* is occasional, frequent or abundant • In September vegetation height is above 5cms, or sward height is between 10-25 cms but scrub (>0.5 metres tall) covers more than 5% of area. Good Condition Marsh Fritillary Habitat is: • Grassland where, for at least 70% of sampling points, the vegetation height is within the range of 7-20 cms • *Succisa pratensis* is present within a 1m radius. • Scrub (>0.5 metres tall) covers no more than 5% of area.
Performance indicators for factors affecting the feature		
F1. Livestock grazing	Without any specific intent, traditional sheep and cattle grazing practices for a number of years have maintained marsh fritillary habitat. Without an appropriate grazing regime, the habitat would become rank and the larval food-plant could disappear. Currently there is quite extensive grazing, between late November and beginning of May by sheep, before they return to the Preseli hills – a practice that has been on-going for over 60 years. There is very little or no grazing for much of the summer and autumn period. This and the exposed nature of the limestone coast currently seem to enable *Succissa* to grow and flower well. In addition the current grazing regime benefits a wide range of other low-growing herbs – including several plants with nectar sources sought after by the	*Upper limit*: The grazing pressure must not be so high as to break down the vegetation structure and cause significant bare areas to appear. *Lower limit*: The site must be subject to sufficient grazing to maintain Suitable or Good Condition Marsh Fritillary habitat as set out above

	emerging butterflies in May and June.	
F2. Burning	Marsh Fritillary colonies are susceptible to damage by burning. The current lack of control over burning (e.g. accidental fires caused by military ordnance) means that parts of the key butterfly range may be vulnerable – especially where *Succissa* patches grow close to low growing coastal heath and gorse scrub. Bracken might also spread into areas - due to increased potash availability favouring its growth after regular or severe fires. NB that some open low bracken may be favoured by marsh fritillaries possibly due to the extra shelter bracken may be providing to larval webs.	*Upper limit*: No burning within key Marsh Fritillary areas *Lower limit*: None set
F3. Changes in military training activities	Currently, military impacts (from tank rounds, vehicles etc, are relatively low within the known marsh fritillary zones. Increased military use of the coast, or changes in target zones or weaponry could possibly impact the marsh fritillary areas.	*Upper limit*: There should be no regular military disturbance to vegetation within the core Marsh Fritillary areas. *Lower limit*: None set



Known extent of marsh fritillary webs in autumn 2006, Castlemartin Cliffs and Dunes SSSI

4.11 Conservation Objective for Feature 11*:* Red-billed chough *Pyrrhocorax pyrrhocorax* A346

Vision for Red-billed chough *Pyrrhocorax pyrrhocorax*

- A breeding chough population will occur along the limestone coast, between Freshwater West and Barafundle Bay.
- This population will be maintained at a minimum of 12 breeding pairs (representing 3.5% of the GB population, at the 1993 SPA designation level)
- Choughs will continue to, feed, roost and breed successfully, unhindered by human recreational activities (e.g. climbing).
- The majority of pairs will rear young each year, with an annual average productivity of at least two young per occupied territory.
- Choughs will continue to have access to large amounts of optimal feeding habitat (open areas with very short grassland and heath vegetation <1cm to <3cm in height) within all cliff-top management units and within dune grassland management units at Broomhill Burrows, Brownslade and Linney Burrows and on Stackpole Warren.
- Yellow ant-hills, an important summer food resource, will occur in coastal turf, throughout the SPA, at densities up to approximately 550 ant-hills per ha.
- A non-breeding chough population (variable in number between 10 and 50 birds) made up largely of juvenile and sub-adult birds will occur at any season.

Note: This feature is not a feature within Gower sections of the SAC

Performance indicators for Red-billed chough *Pyrrhocorax pyrrhocorax*
The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Population distribution	All known occupied chough nest sites within the SPA have been recorded each year since at least 1990. There are usually 10 figure grid refs for most nest sites. Data are in Excel and mapped in GIS and also stored in Recorder. Records of feeding chough, including colour-ring observations to confirm age etc, are mapped in GIS. From these records it is possible to identify areas used by non-breeding chough. These records should provide sufficient information to determine changes in breeding population distribution.	*Upper limit*: None set *Lower limit*: Breeding population: Territory-holding pairs attempting to breed should occur in each of at least eight management units distributed from Castlemartin Range West to Stackpole Head. Non-breeding population: Between October and March, non-breeding choughs (variable flock size) should occur within Broomhill Burrows, Brownslade & Linney Burrows and Stackpole Warren in any one or more of the management units.
A2. Population size	The chough population level in 1993, at the time of designation, was 12 pairs (then approx 3.5% of the UK population). Based on annual surveillance and 2002 decadal survey results, the number of pairs of chough attempting to breed within the SPA has increased to about 20	*Upper limit*: None set *Lower limit*: Breeding population: During a six year period, the average number of summer territory-holding

	pairs. With further increases elsewhere in the UK, the population in 2002 was equivalent to approx 4% of the UK population at that time. In 2007, the breeding population was similar to that of 2002 (at least 20 pairs attempted to breed from 22 territory-holding pairs). During a six-year period, the average number of summer territory-holding pairs in the population should not be less than 3.5% of the GB population. If the Castlemartin population declined below this level, then we would be prompted to check whether the chough population was going against the national trend, or whether it was simply a matter of other areas increasing the opportunities for them. Ten pairs attempting to breed (based on behaviour) appears to be the lowest level the population may be expected to decline to, assuming weather and food shortage related problems, but no obvious change in habitat quality. This is based on long-term surveillance data (including several UK decadal Red-billed Chough population surveys since the 1960s). This population level would still meet current UK SPA qualifying level. The lower limit should be reviewed every six years, and compared with population data from Pembrokeshire, the rest of Wales and future UK decadal surveys. Non-breeding flocks of juveniles and sub-adults can occur in various locations within the SPA, depending on food supply and proximity of good roost sites. The dune grassland areas are especially important locations at various times of the year. When soil invertebrate populations are high, the SPA can attract chough from elsewhere. At other times the number of non-breeders can be quite low.	pairs in the population should be: Not less than the SPA qualifying level (at time of designation); Based on the population size at time of designation in 1993: Not be less than 12 territory –holding pairs per annum, of which, at least 10 pairs should have attempted to breed. <u>Non-breeding population</u>: Between October and March, a non-breeding population of at least 10-50 individuals should occur anywhere within the SPA – either in a number of small groups or in larger flocks.
A3. Annual productivity	Annual chough productivity can be quite variable, low in years with poor invertebrate populations (including periods affected by drought or stormy weather). Numbers surviving to adulthood can be affected by food shortages and the impacts of cold winter weather. Colour-ringing evidence shows that whilst quite a high proportion of young fledge (at least 80%), quite a high number of young disappear within the first several weeks after fledging. Less than 20% survive to breeding age. In any one year it is expected that there will be new recruits to the population. Whilst some chough will become sexually mature when 2 years old, the majority will not breed until their third year, when they have attained sufficient body mass and weight to breed. It is likely that these younger, less experienced birds will be less productive in their first breeding season. Once established in the population, they may survive up to ten or more years. The lower limit for productivity is based on annual surveillance records within the SPA since 1993. This level should be reviewed every six years, and compared with population data from Pembrokeshire and/or further a-field.	*Upper limit*: None set *Lower limit*: During a six year monitoring period: The average number of young fledged per occupied territory should be not less than 2; and The average number of young fledged per successful nest should be not less than 2.5.
A4. Feeding habitat extent	The principal habitats used by the choughs at Castlemartin are caves and cliff crevices for breeding, maritime grassland for feeding throughout the breeding season, and dune grassland between late summer and winter months. They are also known to feed in other habitats, such as winter stubbles on arable land (out-with the SAC/SPA), but these tend to be used more occasionally than the cliffs and dunes. Of the three main habitats used by the choughs, the condition of the maritime grassland is considered to be most critical, as this supports both the adults and young throughout the breeding season (from nest building through to fledgling dispersal).	*Upper limit*: None set *Lower limit*: Extent of maritime grassland and heath mapped within Castlemartin Cliffs and Dunes SSSI (Phase 2, 2004 GIS layer); maritime cliff-top grassland and heath, and dry calcareous grassland and heath at Stackpole SSSI (Leach et al, 1978, GIS layer).
A5. Feeding habitat quality	Choughs require short turf in which to probe and prize out invertebrate prey. This generally needs to no more than 2-4 cm tall. They also exploit the interface between turf and bare ground (such as erosion zones, maritime cliff-crevice, edged of tracks etc). Yellow ant *Lasius flavus* hills in coastal turf also provide an extremely important food source for choughs – especially in	*Upper limit*: None set *Lower limit*: > 40% of the maritime grassland and heath, or within dry calcareous grassland and heath should be less than 3cm high during May/early June. **Maritime grassland:** Vegetation where the combined cover

	mid/late summer. Short maritime grassland is maintained by a combination of wind exposure, salt deposition and sheep grazing. The salt is deposited in sea spray, mostly during storms driven by the prevailing south-westerly winds: this is a limiting factor for many of the more aggressive plant species that would otherwise colonise the habitat.	of *Plantago maritima*, *Armeria maritima* and *Festuca rubra* exceeds 50% within any 50cm radius
Performance indicators for factors affecting the feature		
F1. Livestock grazing/mowing	Grazing is essential to maintain an open species-rich (short and uneven) grassland sward, allowing lots of different plants to grow together, preventing the most competitive coarser plants (like fescue grass, heath or scrub) from taking over. As a general guide, the aim of grazing is to produce an uneven and variable sward, ranging from very short (shorter than a finger lying on its side) to just above ankle height, by the end of summer. Areas of shortest turf should be achievable on coastal slopes and dune hollows, assisted by natural exposure and drought on these shallow impoverished soils. Areas with such swards are especially important for soil invertebrate food for choughs. Sheep grazing plays an important role in keeping the sward low, and making it possible for feeding choughs to access invertebrates in the soil in short (<2-4 cm) turf. Dung from these animals, should also provide a further source of invertebrate populations for choughs and so, where ever possible, livestock should not be dosed with avermectins. Any supplementary feeding should be done with care to avoid causing too much poaching or localised enrichment. A semi-natural rabbit population, present for several hundred years, also makes a very important contribution to the overall grazing levels required by feeding choughs (especially in the dunes). They scrape and maintain bare areas for colonizing plants, for insects requiring	*Upper limit*: None set *Lower limit*: Maintain very short (<2-4 cm high) fairly open turf, with numerous herbs. Patches of open lawn-like areas are important (with dung and providing easy access to soil invertebrates. Grazing pressure must not be so high as to cause nutrient enrichment and/or bare areas to appear, as this is potentially detrimental to other SAC features. <u>Ant-hills</u> Care must be exercised not to damage important ant-hill components through management activities – including mowing, maintenance of paths/tracks and stock-fencing. *Upper limit*: None set *Lower limit*: Maintain a high density of active ant-hills (at least 150 to 550 per ha) within representative areas of maritime and calcareous grassland sampled - in management units 2b to 2g and 3c and 3d. .

	warm open sandy soils and also keep in check young, potentially invasive scrub. Rabbit populations have been affected by disease (e.g. Viral haemorrhagic disease). Surveillance of their population should be maintained. Yellow ant-hills can form quite dense concentrations in key areas – e.g. between 150 to 550 ant-hills per ha have been mapped on Stackpole Head - in management units 3c and 3d. There are also high concentrations along the Castlemartin Range coast. Care must be exercised not to damage important ant-hill components through management activities – including vegetation mowing, maintenance of paths/tracks and stock fencing	
F2. Access and Recreation	Castlemartin's coastal footpath is an extremely popular visitor destination. The coastal cliffs are the principal destination for most walkers, and large numbers of climbers. Currently access and recreation pressures are fairly well regulated. Long-standing voluntary agreements with climbers, also ensures that cliff-nesting birds are quite well protected. Visitors should be made aware, through access permit briefings to Castlemartin Range, leaflets and signage at access points along the coast to ensure approved arrangements are adhered to. It will be essential to maintain, and where ever possible strengthen, links with partner organisations, (e.g. through the Pembrokeshire Outdoor Charter Group, Pembrokeshire Coastal Forum and local and national Climbing Liaison Committees) to monitor visitor pressure and ensure that adequate steps are in place to regulate and protect populations of chough and other potentially sensitive cliff-nesting species.	*Upper limit*: None set Lower limit: Maintain seasonal climbing restrictions at chough nest sites between 1st march and mid July. Advise MoD Castlemartin Range management staff, PCNP Ranger service and NT wardening staff at Stackpole about locations of chough nest sites, to help minimise potential unwitting disturbance from walkers, guided walking groups etc.

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 5: Cleddau Rivers SAC Conservation objectives

EOR0730

Marine Energy Test Area

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Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

a. Outline of the legal context and purpose of conservation objectives.

Conservation objectives for individual SACs and SPAs are required by the 1992 'Habitats' Directive (92/43/EEC). The aim of the Habitats Directive is the maintenance, or where appropriate the restoration, of the 'favourable conservation status' (FCS) of habitats and species listed in the Annexes to the Directive (see Box). Therefore FCS provides the overarching framework for defining the conservation objectives for individual SACs.

Although neither the Birds Directive nor the Ramsar Convention refer to FCS, Natural Resources Wales considers that the overall aim of both those legal instruments is sufficiently similar to FCS to make it practical and proportionate to use the same guiding principle when establishing the conservation objectives for SPAs and Ramsar sites, as well as SACs. Therefore the Habitats Directive definition of FCS is considered to provide the overarching framework for conservation objectives for all SACs, SPAs and Ramsar sites in Wales.

Favourable conservation as defined in Articles 1(e) and 1(i) of the Habitats Directive

"The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

The achievement of FCS is not an objective that applies at the level of the individual sites. Rather it is a wider objective to which each individual site contributes. Therefore the conservation objectives for an individual site are intended to express what is considered to be that site's appropriate contribution to achieving FCS. Since SACs are the most important mechanism in the Habitats Directive for achieving FCS, and the sites represent the most important areas for conservation of the Annex I habitat types and Annex II species, the objectives for each individual SAC should seek to ensure that the site makes a substantial contribution which properly reflects its importance in a local, national and European context and the particular reasons why the site was selected for inclusion in the network. A similar approach is taken to setting conservation objectives for SPAs and Ramsar sites.

Achieving the conservation objectives of individual sites requires appropriate management and the control of factors which are influencing, or may influence the features.

The conservation objectives have a number of specific roles:

- Communication
  The conservation objectives should help convey to stakeholders what are the reasons for the designation and what it is intended to achieve.

- Site planning and management
  The conservation objectives guide management of sites, to maintain or restore the designated habitats and species. They provide the basis for identifying what management is required both within the site boundary, and outside it, where achieving the objectives requires action to be taken outside the site.

- River Basin Management Planning
  Conservation Objectives for aquatic and water dependent Natura 2000 features are also used as the "standards and objectives" referred to in Article 4 (1c) of the Water Framework Directive (WFD) (2000/60/EC). In 2009, Welsh Ministers decided that where Natura 2000 conservation objectives are more stringent than 'Good Ecological Status' (GES) as defined in the WFD, they (and the standards they contain) are the objectives referred to in Article 4(1c) of the WFD.

- Assessing plans and projects
  Article 6(3) of the 'Habitats' Directive requires the assessment of proposed plans and projects in view of a site's conservation objectives. Subject to certain exceptions, plans or projects may not proceed unless it is established that they will not adversely affect the integrity of sites. There are similar requirements for the review of existing decisions and consents.

- Monitoring and reporting
  In addition to foregoing purposes, conservation objectives provide the basis for defining the evidence that will be used for assessing the condition of a feature and the status of factors that affect it. That evidence is

contained in a separate but closely related set of 'performance indicators' which provide the basis for monitoring and reporting. To avoid confusion between the conservation objectives and the measures specified in performance indicators, the performance indicators are set out in an Appendix to this document.

The conservation objectives in this document reflect Natural Resources Wales' current information and understanding of the site and its features and their importance in an international context. The conservation objectives are subject to review by Natural Resources Wales in the light of new knowledge.

b. Format of the conservation objectives

There is one conservation objective for each feature listed in part 3. Each conservation objective is a composite statement representing a site-specific description of what is considered to be the favourable conservation status of the feature. These statements apply to a whole feature as it occurs within the whole plan area, although section 3.2 sets out their relevance to individual management units.

Each conservation objective consists of the following two elements:
1. Vision for the feature
2. Performance indicators

As a result of the general practice developed and agreed within the UK Conservation Agencies, conservation objectives include performance indicators, the selection of which should be informed by JNCC guidance on Common Standards Monitoring (JNCC 2016b).

There is a critical need for clarity over the role of performance indicators within the conservation objectives. **A conservation objective, because it includes the vision for the feature, has meaning and substance independently of the performance indicators, and is more than the sum of the performance indicators**. The performance indicators are simply what make the conservation objectives measurable, and are thus part of, not a substitute for, the conservation objectives. Any feature attribute identified in the performance indicators should be represented in the vision for the feature, but not all elements of the vision for the feature will necessarily have corresponding performance indicators.

As well as describing the aspirations for the condition of the feature, the Vision section of each conservation objective contains a statement that the factors necessary to maintain those desired conditions are under control. Subject to technical, practical and resource constraints, factors which have an important influence on the condition of the feature are identified in the performance indicators.

4.1 Conservation Objective for the watercourse

The ecological status of the watercourse is a major determinant of FCS for all features. The required conservation objective for the watercourse is defined below.

4.1.1 The capacity for the habitats in the SAC to support each feature at near-natural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.

4.1.2 The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure. It is anticipated that in most instances these limits will concur with the standards used by the Review of Consents process.

4.1.3 Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC.

4.1.4 All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change.

4.1.5 Flows, water quality, substrate quality and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed.

4.1.6 The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided.

4.1.7 River SSSI features should be in favourable condition.

4.1.8 Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, eg. weirs, bridge sills, acoustic barriers. The reservoir dams on the Syfynwy are excluded.

4.1.9 Natural factors such as waterfalls, which may limit the natural range of a species feature or dispersal between naturally isolated populations, should not be modified.

4.1.10 Flows during the normal migration periods of sea and river lamprey will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.

4.1.11 Water Quality targets follow those in the revised Common Standards Monitoring Guidance for Rivers (JNCC 2016). These are detailed in Appendix 1 with targets for organic pollution (DO,

BOD and ammonia), phosphate[1], trophic diatom index and acidification.

4.1.12 Potential sources of pollution not addressed in the review of consents, such as contaminated land, will be considered in assessing plans and projects.

4.1.13 Levels of suspended solids will be agreed by NRW for each Water Framework Directive water body in the Afonydd Cleddau SAC. Measures including, but not limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels.

In the Cleddau catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Preventative measures can include surfacing of tracks and gateways, moving feeding areas, and separating clean and dirty water in farmyards. Farm operations should avoid ploughing land which is vulnerable to soil erosion or leaving such areas without crop cover during the winter.

Among toxic pollutants, sheep dip and silage effluent present a particular threat to aquatic animals in this predominantly rural area, especially in the head waters of the Eastern Cleddau. Contamination by synthetic pyrethroid sheep dips, which are extremely toxic to aquatic invertebrates, has a devastating impact on invertebrate populations and can deprive fish populations of food over large stretches of river. These impacts can arise if recently dipped sheep are allowed access to a stream or hard standing area, which drains into a watercourse. Pollution from organophosphate sheep dips and silage effluent can be very damaging locally. Pollution from slurry and other agricultural and industrial chemicals, including fuels, can kill all forms of aquatic life. All sheep dips and silage, fuel and chemical storage areas should be sited away from watercourses or bunded to contain leakage. Recently dipped sheep should be kept off stream banks. Used dip should be disposed of strictly in accordance with NRW Regulations and guidelines. Statutory and voluntary agencies should work closely with landowners and occupiers to minimise the risk of any pollution incidents and enforce existing regulations.

Measures to control diffuse pollution in the water environment, including ‘Catchment Sensitive Farming’, may be implemented as a result of the Water Framework Directive and, along with existing agri-environment schemes, including NRW’s Living rivers Scheme will help to achieve the conservation objectives for the SAC. The conservation objectives should be as detailed as they need to be, to fully capture our aspirations for the features on the site.

[1] All waterbodies within or overlapping a freshwater dependant protected area (or draining into a freshwater dependant protected area) have gone through a process of setting phosphorus targets which involved comparison of targets in the CSM guidance and the WFD. This is to ensure that these waterbodies have a single phosphorus target (the most stringent) for use by Natural Resources Wales for management and monitoring.

The level of detail will also reflect how much we know about the site and its features.

Discharges from sewage treatment works, urban drainage, engineering works such as road improvement schemes, contaminated land, and other domestic and industrial sources can also be significant causes of pollution, and must be managed appropriately. Current consents for discharges entering, or likely to impact upon the site should be monitored, reviewed and altered if necessary.

Overhanging trees provide valuable shade and food sources, whilst tree root systems provide important cover and flow refuges for juveniles. At least 50% high canopy cover to the water course/banks should be maintained, where appropriate. Some reaches may naturally have lower tree cover. Cover may also be lower in urban reaches.

4.2 Conservation Objective for Feature 1: Sea lamprey *Petromyzon marinus* (EU Species Code: 1095)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The conservation objective for the watercourse as defined in 4.1 above is met.
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.
- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

4.3 Conservation Objective for Feature 2 & 3: Brook lamprey *Lampetra planeri* (EU Species Code : 1096); River lamprey *Lampetra fluviatilis* (EU Species Code : 1099)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The conservation objective for the watercourse as defined in 4.1 above is met.
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.
- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

4.4 Conservation Objective for Feature 4: - Bullhead *Cottus gobio* (EU Species Code : 1163)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The conservation objective for the watercourse as defined in 4.1 above is met.
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.
- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

4.5 Conservation Objective for Feature 5: - European otter *Lutra lutra* (EU Species Code: 1355)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The population of otters in the SAC is stable or increasing over the long term and reflects the natural carrying capacity of the habitat within the SAC
- The SAC will have sufficient habitat, including riparian trees and vegetation and wetlands, to support the otter population in the long term
- The natural range of otters in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- The otter must be able to breed and recruit successfully in the SAC. The size of breeding territories may vary depending on prey abundance.
- Otter food sources must be sufficient for maintenance of the population.
- The safe movement and dispersal of individuals around the SAC is facilitated by the provision, where necessary, of suitable riparian habitat, and underpasses, ledges, fencing etc at road bridges and other artificial barriers.
- No otter breeding site should be subject to a level of disturbance that could have an adverse effect on breeding success. Where necessary, potentially harmful levels of disturbance must be managed.

4.6 Conservation Objective for Feature 6: - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat code: 3260)

- The conservation objective for the watercourse as defined in 4.1 above is met.
- The natural range of the plant communities represented within this feature should be stable or increasing in the SAC. The natural range is taken to mean those reaches where predominantly suitable habitat exists over the long term. Suitable habitat and associated plant communities may vary from reach to reach. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms eg. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions eg. nutrient levels, shade (as described in section 2.2). Suitable habitat for the feature need not be present throughout the SAC but where present must be secured for the foreseeable future, except where natural processes cause it to decline in extent.

- The area covered by the feature within its natural range in the SAC should be stable or increasing.
- The conservation status of the feature's typical species should be favourable condition. The typical species are defined with reference to the species composition of the appropriate JNCC river vegetation type for the particular river reach, unless differing from this type due to natural variability when other typical species may be defined as appropriate.

4.7 Conservation Objective for Feature 7: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (EU Habitat code: 91E0)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The canopy is dominated by single stands of alder *Alnus glutinosa* or willow *Salix* spp. In alluvial woods with free draining soils there may be ash or oak in the canopy, but in the wetter alluvial woodlands ash *Fraxinus excelsior* is more likely to be limited to areas of relatively drier ground
- The structure of alluvial woodland is recognised as being dynamic therefore the presence of over mature trees is desirable but not essential
- The river itself should be dynamic to allow for areas of outwash and deposition that trees can regenerate on.
- Lying or standing deadwood (> 20cm diameter and > 1m length) is present at all sites
- The feature should support alluvial ground flora including two of the following: meadowsweet *Filipendula ulmaria*, yellow flag *Iris pseudacorus*, nettle *Urtica dioica*, common reed *Phragmities austrailis*, greater tussock sedge *Carex paniculata*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium*, rushes *Juncus* spp, tufted hair-grass *Deschampsia cespitosa*, hemlock water-dropwort *Onanthe crocata*, and wild angelica *Angelica sylvestris*.

4.8 Conservation Objective for Feature 8: Active raised bogs (EU Habitat code 7110)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- On the mire expanse there are at least 3 of *Calluna vulgaris, Erica tetralix, Eriophorum angustifolium, E.vaginatum* & *Trichophorum cespitosum* constant, with a combined cover not exceeding 80%
- No single species > 50% cover

- At least one of *Andromeda polifolia, Drosera rotundifolia, Empetrum nigrum, Narthecium ossifragum* and *Vaccinium oxycoccos* occurs at least frequently
- On the mire expanse only there are at least 2 of the following spp. constant, with a combined cover > 20%: *Sphagnum capillifolium, S. magellanicum, S. papillosum, S. tenellum*
- No reduction in extent of microtopographic features (e.g. bog pools).

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 6: West Wales Marine SAC Conservation Objectives

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Marine Energy Test Area

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Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

This advice document is for the West Wales Marine / Gorllewin Cymru Forol SAC (Figure 2) which is subject to protection under the Conservation of Habitats and Species Regulations 2017[5] and the Conservation of Offshore Marine Habitats and Species Regulation 2017[6] (collectively referred to as the Habitats Regulations). The advice is given in fulfilment of the duty of the Statutory Nature Conservation Bodies (SNCBs) under the Habitats Regulations to advise Relevant and Competent Authorities as to (a) the Conservation Objectives for the site; and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. The SNCBs aim to ensure that the Conservation Objectives are up-to-date, accessible and enable the assessment of the potential effects of plans and projects.

2 Responsibilities of Relevant and Competent Authorities

Competent Authorities (including those which are also Relevant Authorities) are required to exercise their functions to comply with the Habitats Regulations. Competent Authorities must, within their areas of jurisdiction, consider both direct and indirect effects on the site. This includes considering operations inside and outside the boundary of the SAC, if the impacts could affect the achievement of the site's Conservation Objectives. Decisions on management measures (e.g. the scale and type of mitigation) are the responsibility of the relevant regulatory or management bodies. These bodies will consider SNCB advice and hold discussions with the sector concerned, where appropriate. Where consent is required and the operation (if considered a plan or project) is likely to significantly affect a European Site, Article 6(3) of the Habitats Directive requires that an Appropriate Assessment (AA) is carried out. The AA is part of the “Habitat Regulations Assessment” (HRA), which is a case-specific assessment made in view of the Conservation Objectives for the affected site or sites. Each HRA requires case-specific advice from the SNCB but the assessment is the responsibility of the competent authority concerned.

The variability of harbour porpoise distribution and abundance within sites is in part due to their mobility and wide-ranging nature as well as natural and anthropogenic changes in habitat and prey. Relevant and Competent Authorities are not required to undertake any actions to ameliorate changes in the condition of the site if it is shown that the changes result wholly from natural causes. It is therefore important to contextualise any apparent deterioration of harbour porpoise presence in the site in terms of natural variability and the abundance and distribution patterns at the population level (i.e. MU).

3 Conservation Objectives for harbour porpoise SACs

3.1 The role of Conservation Objectives

Site level Conservation Objectives (COs) are a set of specified objectives that must be met to ensure that the site contributes in the best possible way to achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level (EC, 2012). Conservation Objectives constitute a necessary reference for:

- identifying any site-based conservation measures that may be required;
- carrying out HRAs of the implications of plans or projects.

The purpose of the HRA is to determine whether a plan or project adversely affects a site’s integrity. The critical consideration in relation to site integrity is not the extent or degree of an

[5] http://www.legislation.gov.uk/uksi/2017/1012/contents/made
[6] http://www.legislation.gov.uk/uksi/2017/1013/contents/made

impact, or whether an impact is direct or indirect, but whether a plan or project, either individually or in combination with other plans or projects, affects the site’s ability to achieve its Conservation Objectives and therefore contribute to Favourable Conservation Status.

Harbour porpoise are protected everywhere in European waters under the provisions of the Habitats Regulations. The harbour porpoise in UK waters are considered part of a wider European population and the highly mobile nature of this species means that the concept of a ‘site population’ is not considered an appropriate basis for expressing Conservation Objectives for this species. Site based conservation measures will complement wider ranging measures that are in place for the harbour porpoise.

3.2 Background to Conservation Objectives

The Conservation Objectives are designed to help ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely. Therefore, the focus of the Conservation Objectives for harbour porpoise sites is on addressing pressures that affect site integrity and would include:

- killing or injuring harbour porpoise (directly or indirectly);
- preventing their use of significant parts of the site (disturbance / displacement);
- significantly damaging relevant habitats; or
- significantly reducing the availability of prey.

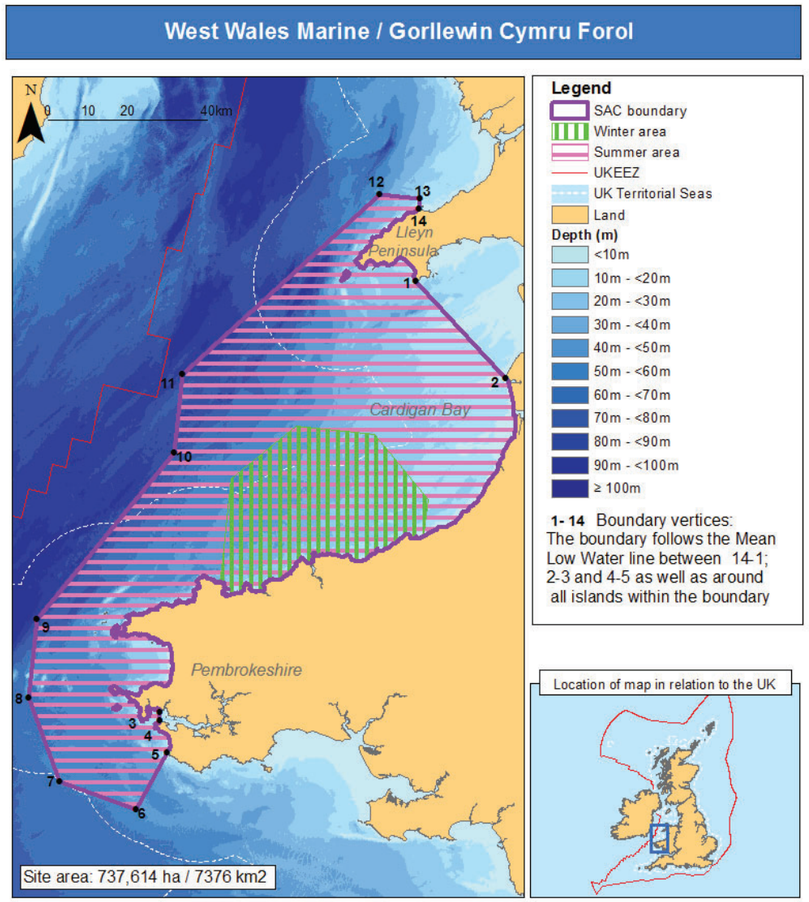
This document includes both a statement of the Conservation Objectives and explanatory text on their intent and interpretation specific to the site. The Objectives have been set taking account of European Commission guidance (EC, 2012). Further guidance on the management of specific pressures of harbour porpoise is being developed.

3.3 The West Wales Marine / Gorllewin Cymru Forol SAC Conservation Objectives

The qualifying feature of the site is the Habitats Directive Annex II species:

- harbour porpoise (*Phocoena phocoena*)

Seasonal differences in the relative use of the site have been identified based on the analyses of Heinänen and Skov (2015). Harbour porpoise sightings data were modelled seasonally (Summer: April-September and Winter: October-March) for each MU. The outputs of this analysis were maps of areas by season and MU, that persistently contained elevated densities of harbour porpoises. These areas were used as the basis for site identification and as a consequence, sites may have seasonal components which should be considered in the assessment of impacts and proposed management. West Wales Marine / Gorllewin Cymru Forol has been designated because of its importance to harbour porpoise in both the summer and winter months (Figure 2).



ID	Latitude	Longitude	ID	Latitude	Longitude
1	52° 46' 39.334" N	4° 31' 51.219" W	8	51° 40' 34.936" N	5° 35' 45.826" W
2	52° 36' 23.933" N	4° 7' 44.200" W	9	51° 51' 15.003" N	5° 37' 48.561" W
3	51° 42' 37.788" N	5° 7' 2.965" W	10	52° 17' 8.258" N	5° 16' 24.038" W
4	51° 41' 31.531" N	5° 6' 50.849" W	11	52° 27' 48.796" N	5° 18' 24.819" W
5	51° 37' 27.017" N	5° 3' 46.364" W	12	52° 57' 12.758" N	4° 43' 46.104" W
6	51° 29' 4.939" N	5° 7' 35.762" W	13	52° 57' 47.171" N	4° 34' 54.971" W
7	51° 30' 32.201" N	5° 25' 11.359" W	14	52° 56' 21.129" N	4° 34' 39.841" W

Figure 2: The West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation for harbour porpoise. Summer and winter areas shown.

The Conservation Objectives for the site are:

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

1. Harbour porpoise is a viable component of the site;

2. There is no significant disturbance of the species; and

3. The condition of supporting habitats and processes, and the availability of prey is maintained.

Conservation Objective 1: Harbour porpoise is a viable component of the site

This SAC has been selected primarily based on the long-term, relatively higher densities of porpoise in contrast to other areas of the MU. The implication is that the SAC provides relatively good foraging habitat and may also be used for breeding and calving. However, because the number of harbour porpoise using the site naturally varies (e.g. between seasons), there is no exact value for the number of animals expected within the site.

The intent of this objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the site. Specifically, this objective is primarily concerned with operations that would result in unacceptable levels of those impacts on harbour porpoises using the site. Unacceptable levels can be defined as those having an impact on the FCS of the populations of the species in their natural range. The reference population for assessments against this objective is the MU population in which the SAC is situated (IAMMWG, 2015).

The harbour porpoise is a European Protected Species (EPS) listed on Annex IV of the Habitats Directive and as such is protected under the Habitats Directive Article 12 and transposing regulations from deliberate killing (or injury), capture and disturbance throughout its range. In addition, Article 12 (4) of the Habitats Directive is concerned with incidental capture and killing. It states that Member States 'shall establish a system to monitor the incidental capture and killing of the species listed on Annex IV (all cetaceans). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned'. Site based measures should therefore be aligned with the existing strict protection measures in place throughout UK waters. Significant disturbance within or affecting the site is considered in the second conservation objective.

Conservation Objective 2: There is no significant disturbance of the species

Disturbance of harbour porpoise typically, but not exclusively, originates from operations that cause underwater noise including, as examples, seismic surveys, pile driving and sonar. Responses to noise can be physiological and/or behavioural. JNCC has produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise[7]. However, disturbance is primarily a behavioural response to noise and may, for example, lead to harbour porpoises being displaced from the affected area.

This SAC was identified as having persistently higher densities of harbour porpoises (Heinänen and Skov, 2015) compared to other areas of the MU. This is likely linked to the habitats within the site providing good feeding opportunities. Therefore, operations within or

[7] http://jncc.defra.gov.uk/page-4273

affecting the site should be managed to ensure that the animals' potential usage of the site is maintained. Disturbance is considered significant if it leads to the exclusion of harbour porpoise from a significant portion of the site. Specifically, draft SNCB advice / guidance for assessing the significance of noise disturbance to a site suggests:

Noise disturbance within an SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than:

1. 20% of the relevant area[8] of the site in any given day[9], and

2. an average of 10% of the relevant area of the site over a season[10,11].

Conservation Objective 3: The condition of supporting habitats and processes, and the availability of prey is maintained

Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat. The maintenance of supporting habitats and processes contributes to ensuring that prey is maintained within the site and is available to harbour porpoises using the site. Some evidence shows that the harbour porpoise has a high metabolic rate compared to terrestrial mammals of similar size (Rojano-Doñate et al., 2018) and high feeding rates (Wisniewska et al., 2016). The harbour porpoise is therefore thought to be a species that is highly dependent on a year-round proximity to food sources and its distribution and condition may strongly reflect the availability and energy density of its prey (Brodie 1995 in Santos & Pierce, 2003). The densities of porpoise using a site are likely linked to the availability (and density) of prey within the site. Harbour porpoise eat a variety of prey including gobies, sandeel, whiting, herring and sprat. However, the diet of porpoises when within the sites is not well known but is likely comparable to that in the wider seas.

There are several operations (Table 2) which potentially affect the achievement of this Conservation Objective. Whilst some plans/projects are unlikely to have a significant effect alone, an effect might become significant when considered in combination with other plans/projects and against the background of existing activities/pressures on the site. Further work is needed to assess historic, existing and planned levels of plans/projects in the sites and to better understand their impacts on the habitats and prey within the sites.

4 Advice on Operations

4.1 Purpose of advice

This section details the activities specifically occurring within or close to the West Wales Marine / Gorllewin Cymru Forol SAC that would be expected to impact the site; this is known as Advice on Operations. Initial assessments were conducted at a UK scale, with

[8] The relevant area is defined as that part of the SAC that was designated on the basis of higher persistent densities for that season (summer defined as April to September inclusive, winter as October to March inclusive).
[9] Applicable only in Habitats Regulations Assessments (HRA) due to impracticality of daily noise limit management of activities, but retrospective compliance analysis advised
[10] Summer defined as April to September inclusive, winter as October to March inclusive
[11] For example, a daily footprint of 19% for 95 days would result in an average of 19x95/183 days (summer) =9.86%

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 7: Bristol Channel Approaches SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status					
Version	**Date**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue		
Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

This advice document is for the Bristol Channel Aproaches / Dynesfeydd Môr Hafren SAC (Figure 2) which is subject to protection under the Conservation of Habitats and Species Regulations 2017[5] and the Conservation of Offshore Marine Habitats and Species Regulation 2017[6] (collectively referred to as the Habitats Regulations). The advice is given in fulfilment of the duty of the Statutory Nature Conservation Bodies (SNCBs) under the Habitats Regulations to advise Relevant and Competent Authorities as to (a) the Conservation Objectives for the site; and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. The SNCBs aim to ensure that the Conservation Objectives are up-to-date, accessible and enable the assessment of the potential effects of plans and projects.

2 Responsibilities of Relevant and Competent Authorities

Competent Authorities (including those which are also Relevant Authorities) are required to exercise their functions to comply with the Habitats Regulations. Competent Authorities must, within their areas of jurisdiction, consider both direct and indirect effects on the site. This includes considering operations inside and outside the boundary of the SAC, if the impacts could affect the achievement of the site's Conservation Objectives. Decisions on management measures (e.g. the scale and type of mitigation) are the responsibility of the relevant regulatory or management bodies. These bodies will consider SNCB advice and hold discussions with the sector concerned, where appropriate. Where consent is required and the operation (if considered a plan or project) is likely to significantly affect a European Site, Article 6(3) of the Habitats Directive requires that an Appropriate Assessment (AA) is carried out. The AA is part of the “Habitat Regulations Assessment” (HRA), which is a case-specific assessment made in view of the Conservation Objectives for the affected site or sites. Each HRA requires case-specific advice from the SNCB but the assessment is the responsibility of the competent authority concerned.

The variability of harbour porpoise distribution and abundance within sites is in part due to their mobility and wide-ranging nature as well as natural and anthropogenic changes in habitat and prey. Relevant and Competent Authorities are not required to undertake any actions to ameliorate changes in the condition of the site if it is shown that the changes result wholly from natural causes. It is therefore important to contextualise any apparent changes in harbour porpoise presence within the site in terms of natural variability and the abundance and distribution patterns at the population level (i.e. MU).

3 Conservation Objectives for harbour porpoise SACs

3.1 The role of Conservation Objectives

Site level Conservation Objectives are a set of specified objectives designed to ensure that the site contributes in the best possible way to achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level (EC, 2012). Conservation Objectives constitute a necessary reference for:

- identifying any site-based conservation measures that may be required;
- carrying out HRAs of the implications of plans or projects.

The purpose of the HRA is to determine whether a plan or project could adversely affect a site’s integrity. The critical consideration in relation to site integrity is not the extent or degree of an impact, or whether an impact is direct or indirect, but whether a plan or project, either individually or in combination with other plans or projects, affects the site’s ability to achieve its Conservation Objectives and therefore contribute to Favourable Conservation Status.

Harbour porpoise are protected everywhere in European waters under the provisions of the Habitats Regulations. The harbour porpoise in UK waters are considered part of a wider European population and the highly mobile nature of this species means that the concept of a ‘site population’ is not considered an appropriate basis for expressing Conservation Objectives for this species. Site based conservation measures will complement wider ranging measures that are in place for the harbour porpoise.

3.2 Background to Conservation Objectives

The Conservation Objectives are designed to help ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely. Therefore, the focus of the Conservation Objectives for harbour porpoise sites is on addressing pressures that affect site integrity and would include:

- killing or injuring harbour porpoise (directly or indirectly);
- preventing their use of significant parts of the site (disturbance / displacement);
- significantly damaging relevant habitats; or
- significantly reducing the availability of prey.

This document includes both a statement of the Conservation Objectives and explanatory text on their intent and interpretation specific to the site. The Objectives have been set taking account of European Commission guidance (EC, 2012). Further guidance on the management of specific pressures on harbour porpoise is being developed.

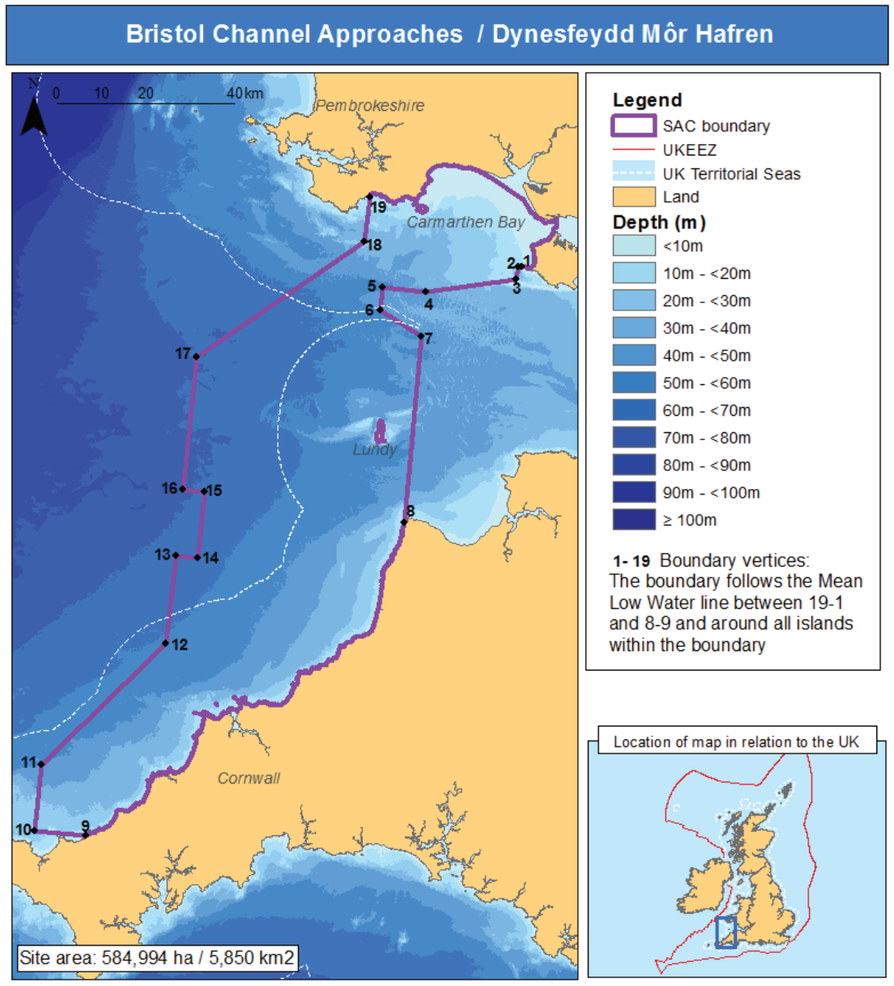
3.3 Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC Conservation Objectives

The qualifying feature of the site is the Habitats Directive Annex II species:

- harbour porpoise (*Phocoena phocoena*)

Seasonal differences in the relative use of the site have been identified based on the analyses of Heinänen and Skov (2015). Harbour porpoise sightings data were modelled seasonally (Summer: April-September and Winter: October-March) for each MU. The outputs of this analysis were maps of areas by season and MU, that persistently contained elevated densities of harbour porpoises. These areas were used as the basis for site identification and as a consequence, sites may have seasonal components which should be considered in the assessment of impacts and proposed management. Bristol Channel Approaches / Dynesfeydd Môr Hafren (Figure 2) has been designated because of its importance to harbour porpoise in the winter months (October to March).

[5] http://www.legislation.gov.uk/uksi/2017/1012/contents/made
[6] http://www.legislation.gov.uk/uksi/2017/1013/contents/made



ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude
1	51° 33' 50.9" N	4° 20' 1.3" W	8	51° 0' 32.0" N	4° 32' 9.0" W	14	50° 51' 6.0" N	5° 9' 27.8" W
2	51° 33' 48.3" N	4° 20' 44.1" W	9	50° 15' 17.4" N	5° 18' 49.2" W	15	50° 59' 6.7" N	5° 10' 52.6" W
3	51° 32' 12.4" N	4° 20' 28.6" W	10	50° 14' 35.3" N	5° 28' 27.3" W	16	50° 58' 48.7" N	5° 15' 6.3 W
4	51° 28' 26.2" N	4° 37' 7.9" W	11	50° 22' 35.6" N	5° 29' 53.4" W	17	51° 14' 49.8" N	5° 17' 59.2" W
5	51° 27' 52.1" N	4° 45' 44.3" W	12	50° 40' 7.3" N	5° 11' 48.0" W	18	51° 32' 55.6" N	4° 50' 56.4" W
6	51° 25' 11.8" N	4° 45' 17.1" W	13	50° 50' 48.2" N	5° 13' 40.9" W	19	51° 38' 16.5" N	4° 51' 52.1" W
7	51° 23' 5.2" N	4° 36' 17.1" W						

Figure 2: Bristol Channel Aproaches / Dynesfeydd Môr Hafren Special Area of Conservation for harbour porpoise.

The Conservation Objectives for the site are:

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

1. Harbour porpoise is a viable component of the site;

2. There is no significant disturbance of the species; and

3. The condition of supporting habitats and processes, and the availability of prey is maintained.

Conservation Objective 1: Harbour porpoise is a viable component of the site

This SAC has been selected primarily based on the long-term, relatively higher densities of porpoise in contrast to other areas of the MU. The implication is that the SAC provides relatively good foraging habitat and may also be used for breeding and calving. However, because the number of harbour porpoise using the site naturally varies (e.g. between seasons), there is no exact number of animals within the site.

The intent of this objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the site. Specifically, this objective is primarily concerned with operations that would result in unacceptable levels of those impacts on harbour porpoises using the site. Unacceptable levels can be defined as those having an impact on the FCS of the populations of the species in their natural range. The reference population for assessments against this objective is the MU population in which the SAC is situated (IAMMWG 2015).

The harbour porpoise is a European Protected Species (EPS) listed on Annex IV of the Habitats Directive and as such is protected under the Habitats Directive Article 12 and transposing regulations from deliberate killing (or injury), capture and disturbance throughout its range. In addition, Article 12 (4) of the Habitats Directive is concerned with incidental capture and killing. It states that Member States 'shall establish a system to monitor the incidental capture and killing of the species listed on Annex IV (all cetaceans). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned'. Site based measures should therefore be aligned with the existing strict protection measures in place throughout UK waters. Significant disturbance within or affecting the site is considered in the second conservation objective.

Conservation Objective 2: There is no significant disturbance of the species

Disturbance of harbour porpoise typically, but not exclusively, originates from operations that cause underwater noise including, as examples, seismic surveys, pile driving and sonar. Responses to noise can be physiological and/or behavioural. JNCC has produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise[7]. However, disturbance is primarily a behavioural response to noise and may, for example, lead to harbour porpoises being displaced from the affected area.

This SAC was identified as having persistently higher densities of harbour porpoises (Heinänen and Skov 2015) compared to other areas of the MU. This is likely linked to the habitats within the site providing good feeding opportunities. Therefore, operations within or

[7] http://jncc.defra.gov.uk/page-4273

affecting the site should be managed to ensure that the animals' potential usage of the site is maintained. Disturbance is considered significant if it leads to the exclusion of harbour porpoise from a significant portion of the site. Specifically, draft SNCB advice / guidance for assessing the significance of noise disturbance to a site suggests:

Noise disturbance within an SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than:

1. 20% of the relevant area[8] of the site in any given day[9], and

2. an average of 10% of the relevant area of the site over a season[10,11].

Conservation Objective 3: The condition of supporting habitats and processes, and the availability of prey is maintained

Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat. The maintenance of supporting habitats and processes contributes to ensuring that prey is maintained within the site and is available to harbour porpoises using the site. Some evidence shows that the harbour porpoise has a high metabolic rate compared to terrestrial mammals of similar size (Rojano-Doñate et al. 2018) and high feeding rates (Wisniewska et al., 2016). The harbour porpoise is therefore thought to be a species that is highly dependent on a year-round proximity to food sources and its distribution and condition may strongly reflect the availability and energy density of its prey (Brodie 1995 in Santos & Pierce, 2003). The densities of porpoise using a site are likely linked to the availability (and density) of prey within the site. Harbour porpoise eat a variety of prey including gobies, sandeel, whiting, herring and sprat. However, the diet of porpoises when within the sites is not well known but is likely comparable to that in the wider seas.

There are several operations (Table 2) which potentially affect the achievement of this Conservation Objective. Whilst some plans/projects are unlikely to have a significant effect alone, an effect might become significant when considered in combination with other plans/projects and against the background of existing activities/pressures on the site. Further work is needed to assess historic, existing and planned levels of plans/projects in the sites and to better understand their impacts on the habitats and prey within the sites.

4 Advice on Operations

4.1 Purpose of advice

This section details the activities specifically occurring within or close to the Bristol Channel Aproaches / Dynesfeydd Môr Hafren SAC that would be expected to impact the site; this is

[8] The relevant area is defined as that part of the SAC that was designated on the basis of higher persistent densities for that season (summer defined as April to September inclusive, winter as October to March inclusive).
[9] Applicable only in Habitats Regulations Assessments (HRA) due to impracticality of daily noise limit management of activities, but retrospective compliance analysis advised
[10] Summer defined as April to September inclusive, winter as October to March inclusive
[11] For example, a daily footprint of 19% for 95 days would result in an average of 19x95/183 days (summer) =9.86%

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 8: Cardigan Bay SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status

Version	Date	Authored by	Reviewed by	Approved by	Review date
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue

Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

5. Conservation Objectives

This latest version of the Regulation 37 package has been revised to improve accessibility of conservation objectives and to update the legislative context. The intent of the conservation objectives and of the advice on operations which may cause deterioration or disturbance to the feature is the same as in previous versions. The Conservation Objectives are now shorter and more generic but there has been no change in what is considered to represent Favourable Conservation Status.

In order to meet the aims of the Habitats Directive, the conservation objectives seek to maintain (or restore) the habitat and species features, as a whole, at (or to) favourable conservation status (FCS) within the site.

The Vision Statement is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives into a single, integrated statement about the site.

5.1 Vision statement for Cardigan Bay

Our vision for the Cardigan Bay Special Area of Conservation (SAC) is one of a high quality marine environment, where the protected habitats and species of the site are in a condition as good as or better than when the site was selected; where human activities co-exist in harmony with the habitats and species of the site and where use of the marine environment is undertaken sustainably.

5.2 Conservation objectives for the Cardigan Bay Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Sandbanks which are slightly covered by seawater all the time
- Reefs
- Submerged or partially submerged sea caves

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.
For the **reef** feature these include;

- Intertidal bedrock reefs
- Intertidal cobble, pebble with *Sabellaria alveolata* (biogenic) reefs
- Subtidal bedrock reefs
- Subtidal pebble, cobble and boulder reefs
- Sea caves

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the feature species populations, their abundance or range taking into account bioaccumulation and biomagnification.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

5.2.5 Species Features

- Grey Seal
- Bottlenosed dolphin
- River Lamprey
- Sea Lamprey

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal** populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.

- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour

5.2.8 Restoration and recovery

As part of this objective it should be noted that for the **bottlenose dolphin** populations should be increasing.

5.3 Understanding the Conservation Objectives

5.3.1 A dynamic marine environment

The conservation objectives recognise and acknowledge that the features are part of a complex, dynamic, multi-dimensional environment. The structures, functions (environmental processes) and species populations of habitat features are inextricably linked. Marine habitats are complex ecological webs of species, habitat structure and environmental functions that vary dynamically in time and space. Variety and change in habitat structure is primarily driven by environmental and physicochemical factors, including water movement, water quality, and sediment supply and prevailing weather conditions.

The species populations associated with these habitats also vary in time and space and this is, in part, a direct reflection of the variable habitat structure and dynamic environment. It is also the product of stochastic events and the great variation in survival and recruitment of species, particularly those with dispersive reproductive strategies.

Within the dynamism of habitats and species, there is also an element of stability and persistence, where species' and communities' populations as well as physical habitat structure show little overall long-term variation.

5.3.2 Human activities

These conservation objectives recognise and acknowledge that human activity has already modified and continues to modify habitats and species populations in various ways, to varying degrees and at varying spatial and temporal scales, either acutely or chronically. The conservation objectives do not aim to prevent all change to the habitat and species features, or to achieve an indefinable, abstract natural or pristine state, since these would be unrealistic and unattainable aspirations. Rather, they seek to prevent further negative modification of the extent, structure and function of natural habitats and species' populations by human activity and to ensure that degradation and damage to the features that is attributable to human activities or actions is prevented. Consequently, in order to meet the requirements of the Directive and ensure the site makes its appropriate contribution to conservation of biodiversity, the conservation objectives seek to:

- Encompass inherent dynamism rather than to work against it;
- Safeguard features and natural processes from those impacts of human activity that cause damage to the features through the degradation of their range, extent, structure, function or typical species;

- Facilitate, where necessary, restoration of features or components of features that are currently damaged or degraded and in unfavourable condition.

The term *degradation* is used to encompass damage or deterioration resulting only from such human activities or actions as have a detrimental effect on the feature. The magnitude of any degradation is dependent on the longevity and scale of the impact and the conservation importance of the species or habitats on which the impact occurs. This is influenced by:

- the type of human action, its nature, location, timing, frequency, duration and intensity;
- the species or habitats, and their intolerance and recoverability.

Outcomes arising from human action that are likely to be considered detrimental include such effects such as:

- permanent and long-term change of distribution or reduction in extent of a feature or feature component, or temporary modification or reduction sufficiently significant to negatively impact on biota or ecological processes;
- reduction in ecological function caused by loss, reduction or modification of habitat structural integrity;
- interference in or restriction of the range, variety or dynamism of structural, functional or ecological processes, *e.g.*: alteration of habitat structure, obstruction of tidal streams, chronic or acute thermal, salinity or suspended sediment elevations or reductions;
- hypertrophication or eutrophication;
- contamination by biologically deleterious substances;
- reduction in structure, function and abundance of species populations;
- change in reproductive capacity, success or recruitment of species populations;
- reduction in feeding opportunities of species populations
- reduction of health to a sub-optimal level, or injury, rendering the population less fit for, *inter alia,* breeding, foraging, social behaviour, or more susceptible to disease;
- increase in abundance and range of opportunist species through the unnatural generation of preferential conditions (*e.g.* organic enrichment), at the expense of existing species and communities.
- increase in abundance and range of non-native species.

Table 2 provides illustrative examples of specific changes and whether they would constitute degradation of the feature.

It is important to note that many human activities can either be beneficial (reduce or reverse detrimental human influence (*e.g.* improve water quality)), trivial (*e.g.* no significant and/or substantive long-term effect) or benign (no outcome) in terms of their impact on marine habitats and species.

Advice on potentially detrimental human activities is provided in Section 6 (activities or operations which may cause damage or disturbance to features).

Table 2: Examples of change and whether they would constitute degradation of the feature.

Degradation	Not Degradation
Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by high tissue burdens of anthropogenically derived contaminants.	Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by density dependent incidence of endemic disease.
Modification of a seabed community by organically rich effluent from a new sewage outfall.	Modification of a seabed community as a result of a reduction in organic material entering the sea from a sewage outfall.
Change in seabed community composition as a result of coastal engineering that has altered local wave exposure.	Change in seabed community composition as a result of a cliff fall, the debris from which has altered local wave exposure.
Change to the species composition of a seabed community as a result of an increase in scallop dredging intensity.	Change to the composition of a seabed community as a result of a reduction in scallop dredging intensity.
Permanent reduction of extent of sand and mud-flat as a result of new coastal development.	Permanent reduction of extent of sand and mud-flat as a result of long-term natural changes in sediment transport.
Changes in sediment granulometry as a result of beach recharge operations	Changes in sediment granulometry as a result of natural cliff fall and erosion

5.3.3 Use of the conservation objectives – Site management

The components of favourable conservation status detailed in the conservation objectives have different sensitivities and vulnerabilities to degradation by human activities. Conservation and protection of site features is provided by management, which should be based on levels of risk. The form of management and degree of protection necessary will vary spatially, temporally and from one feature component to another due to their differences in conservation importance and their sensitivity and susceptibility to change as a result of human action. Therefore it needs to be understood that these conservation objectives require a risk-based approach to the identification, prioritisation and implementation of management action.

Security of management is provided in part 6, sections 59 to 66, of the Conservation of habitats and Species Regulations 2017, which require the assessment of plans and projects likely to have a significant effect on the site.

Where there is a potential for a plan or project to undermine the achievement of the conservation objectives, NRW will consider the plan/project to be likely to have a significant effect and require appropriate assessment. Unless it is ascertained, following an appropriate assessment, that a plan or project will not undermine the achievement of the conservation objectives, the plan/project should be considered as having an adverse effect on the integrity of the site[64].

Appropriate and secure management of activities may also be provided through a site management plan.

[64] Uncertainity should not result in a conclusion of no adverse effect on site integrity.

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 9: Lundy SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status					
Version	**Date**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue		
Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

European Site Conservation Objectives for Lundy Special Area of Conservation Site Code: UK0013114

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of qualifying natural habitats and habitats of qualifying species**
- **The structure and function (including typical species) of qualifying natural habitats**
- **The structure and function of the habitats of qualifying species**
- **The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely**
- **The populations of qualifying species, and,**
- **The distribution of qualifying species within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks
H1170. Reefs
H8330. Submerged or partially submerged sea caves
S1364. *Halichoerus grypus*; Grey seal

This is a European Marine Site

This site is a part of the Lundy European Marine Site. These Conservation Objectives should be used in conjunction with the Conservation Advice document for the EMS. Natural England's formal Conservation Advice for European Marine Sites can be found via GOV.UK.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a Special Area of Conservation (SAC). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

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MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 10: Lleyn Peninsula and the Sarnau SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status					
Version	**Date**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue		
Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

5. Conservation Objectives

This latest version of the Regulation 37 package has been revised to improve accessibility of conservation objectives and to update the legislative context. The intent of the conservation objectives and of the advice on operations which may cause deterioration or disturbance to the feature is the same as in previous versions. The Conservation Objectives are now shorter and more generic but there has been no change in what is considered to represent Favourable Conservation Status.

In order to meet the aims of the Habitats Directive, the conservation objectives seek to maintain (or restore) the habitat and species features, as a whole, at (or to) favourable conservation status (FCS) within the site.

The Vision Statement is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives into a single, integrated statement about the site.

5.1 Vision statement for Pen Llŷn a'r Sarnau

NRW's vision for the Pen Llŷn a'r Sarnau SAC is for a high quality marine and coastal environment which is healthy, productive and biologically diverse, supporting resilient marine ecosystems and communities. The special habitat and species features of the SAC will be maintained and, where necessary, restored so that they will be able to sustain themselves in the long-term as part of naturally functioning ecosystems. The diversity of the wildlife habitats and species in the SAC will not be degraded.

The varied physical character and processes in different parts of the SAC will operate without any undue interference, this includes the natural processes of tides, waves and currents and the associated processes of sediment erosion and deposition. The quality of water in the SAC will be maintained or restored to a level necessary to maintain the features in favourable condition for the foreseeable future. The health and quality of the 12 SAC features are inter-related and will also depend on the state of other non SAC feature marine habitats within the site, as well as structural and functional components of the marine ecosystem.

The reefs of the SAC should continue to comprise a large variety of habitats and their associated biological communities both on the shore and underwater. The different components of the reef habitat should continue to be present with no significant loss of extent, and the quality of the wildlife communities they support should be maintained or enhanced; these components comprise reef formed from different types of hard substrate throughout the site (bedrock, boulders, cobbles and mixed ground), biogenic reefs and carbonate reef. The potential for expansion of the biogenic reef communities on the shore and underwater will be safeguarded through appropriate management.

The large shallow bay feature (Tremadog Bay) should continue to comprise a variety of high quality sediment and hard substrate habitats and their associated biological communities. The special characteristics of the bay will be maintained, including species rich and species diverse subtidal sediments as the dominant habitat type within the bay. The subtidal sediments should comprise a mosaic of sediment types including extensive

areas of muddy gravel, fine and muddy sand and mud. On the shore, the condition of the varied habitat types and their associated communities will be expected to be maintained or improved under appropriate management. The intertidal habitat types present will include muddy and sandy gravel, mixed sediment and boulder shores, bedrock, sand and shingle. The natural biological productivity of the bay and its ability to function as a nursery area for fish and shellfish species will be maintained and safeguarded. The potential for expansion of the biogenic reefs and eelgrass (seagrass) communities that are components of the bay feature should be safeguarded through appropriate management.

The subtidal sandbanks for the SAC should continue to comprise mobile or highly mobile sediment habitats and their associated communities. The overall structure, sediment characteristics and biological communities of the Tripods, Bastram Shoal and Devil's Ridge sandbanks will reflect their exposure to the prevailing south-westerly winds and strong tidal flow. The sediment characteristics and biological communities of the Four-fathom bank sandbank will reflect conditions of slightly less exposure to wind and tidal currents. Sediment supply and hydrodynamic processes forming the sandbanks will continue unhindered. The condition of the biological communities within and on the sediment, together with mobile species associated with the sandbanks, will be maintained or improved under appropriate management.

Each of the three estuaries of the SAC will continue to be shallow, bar-built drying estuaries supporting a mosaic of habitats and associated wildlife that reflects the transition from the estuarine to terrestrial habitats. The estuaries will support good quality saltmarsh transitions to other habitats such as shingle, sand dune, peat mire, brackish and freshwater marsh, reed swamp, bog and woodland. The sediments of the estuaries will continue to comprise a high proportion of sandy to muddy sediments, and the sediment type and biological communities associated with them will reflect a gradient from more exposed and saline conditions at the mouth of each estuary to more sheltered freshwater-influenced communities in their landward reaches. The structure and characteristics of each estuary will be determined by unhindered geomorphological and biological processes, including sediment transport, erosion and accretion and the influence of flood events and by appropriate management of the surrounding catchments. Artificial constraints on the estuaries form and functioning will be minimised to ensure the long-term presence and viability of estuary habitats; restore floodplain functions and habitats; and improve the ecosystem resilience to climate change. The estuaries will continue to function as fish nursery areas and to support important populations of migratory fish and birds, and other key species such as otter.

The Morfa Gwyllt coastal lagoon will continue to be present in its current location with no loss of extent or reduction in its ability to provide a specialised brackish water lagoon habitat. Specialist lagoon species will continue to be present as viable populations together with a range of other marine species characteristic of the predominantly sediment habitat in the lagoon basin. The negative impact of disturbance to the lagoon from human activities would be expected to be reduced under appropriate management, thereby improving the ability of Morfa Gwyllt to continue to exist and function as a coastal lagoon.

The intertidal mudflats and sandflats feature should continue to comprise an array of sediment habitats and their associated biological communities, ranging from exposed and moderately exposed sands in open coast situations, through exposed to sheltered sands and muds in estuarine conditions. Complete examples of zonation of exposed and

moderately exposed sediment communities will continue to be present. The quality of intertidal mudflat and sandflat communities would be expected to be maintained or improved. The potential for expansion of the nationally scarce eelgrass (seagrass) community should be safeguarded through appropriate management. The long-term viability and quality of the intertidal mudflats and sandflats in estuarine conditions may be enhanced by restoration of more naturally functioning estuary systems.

The site retains its complete sequences of saltmarsh vegetation, from pioneer vegetation, such as glasswort, through to upper saltmarsh. The variety of communities will continue to be present and their quality will be maintained or improved. The long-term viability and quality of the saltmarsh features will be improved through management of the estuaries that restores more naturally functioning estuary systems.

The sea caves feature should continue to comprise intertidal and subtidal caves, clefts, crevices and tunnels in the bedrock substrate within the SAC. The extent of the sea caves and the variety and quality of the biological communities they support will be maintained or improved. Many of the caves (intertidal and subtidal) will continue to support well-developed zonation of sea cave communities. The sea caves of the SAC will continue to provide accessible and high quality breeding places for grey seal.

The SAC will continue to provide a productive and supportive marine area for grey seals. The population of grey seals frequenting the SAC will form and important component of a larger southwest UK population of grey seals. Grey seals will continue to be widespread throughout the SAC predominantly in areas of open coast and sea. Grey seals will have access to, and sufficient availability of prey, and they will have widespread availability and access to good quality essential habitats, including areas for hauling out and pupping, that are free from excessive disturbance. The quality and distribution of haul out and breeding sites for grey seals within the site will be maintained or improved through appropriate management.

The SAC will continue to provide a productive and supportive marine area for bottlenose dolphin. Bottlenose dolphin will continue to be widespread within the waters of the SAC and those frequenting the SAC will reflect a healthy population structure including immature and adult male and female dolphins. The bottlenose dolphins in the SAC will form an important component a larger population of this species present in Cardigan Bay and in the wider sea area around Wales and the north east Atlantic. The animals using the SAC will reflect good physiological health. The bottlenose dolphins will have access to and sufficient availability of prey, and they will have widespread availability and access to good quality essential habitats free from excessive disturbance. The quality and distribution of essential habitats (such as for feeding, calving, resting and travelling) within the site will be maintained or improved through appropriate management.

Otters will continue to be widespread throughout the SAC both in areas of open coast and within the estuaries. Otters will have sufficient availability of prey and widespread availability and access to good quality essential habitats including freshwater and undisturbed resting and breeding sites to allow the otter population to thrive. The distribution, breeding centres and actual/potential breeding sites of otters within the site and adjacent catchments will be maintained or improved through appropriate management.

The landscape quality and conservation value of the area will continue to be high. The presence of the Pen Llŷn a'r Sarnau SAC and its special wildlife enhances the economic and social values of the area by providing a high quality environment for fisheries, outdoor activities, ecotourism, scientific and educational study, and peaceful enjoyment by local people and visitors. The positive contribution of the SAC to the natural, social and economic quality of the area will be recognised and promoted through appropriate sea and land management which ensures compatibility between activities and the sustainable use of the site. Local communities will take pride in their surroundings and work actively to make sustainable improvements for future generations.

5.2 Conservation objectives for the Pen Llŷn a'r Sarnau Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Reefs
- Large shallow inlets and bays
- Sandbanks which are slightly covered by seawater all the time
- Estuaries
- Coastal lagoons
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows
- *Salicornia* and other annuals colonising mud and sand
- Submerged or partially submerged sea caves

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **reef** feature these include;

- Rocky intertidal reefs
- Rocky subtidal reefs
- Extensive boulder and cobble reefs – the sarnau
- Biogenic reefs (horse mussel *Modiolus modiolus* reef / green crenella *Musculus discors* reef and Honeycomb worm *Sabellaria alveolata* reef
- Carbonate reef formed by methane gas leaking from the seabed.

For the **intertidal mudflat and sandflat** feature these include:

- Mya arenaria and polychaetes in muddy gravel
- Eel grass Zostera marina beds.
- Muddy gullies in the Mawddach estuary.

For the ***Salicornia*** feature this includes:

- Communities characterised by the species *Sarcocornia perennis*.

For the **intertidal mudflats and sandflats** and **sandbanks** features this requires an overall stability or increase in the amount of the feature, taking into account the areas of long term stability and localised losses and additions arising from environmental processes.

For **estuaries** this includes the stability of sandy sediments in proportion to the muddy sediments.

Restoration and recovery
As part of this objective it should be noted that; for the **estuaries** feature additional land which should form an integral part of the estuarine ecosystem should be restored

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the feature species populations, their abundance or range taking into account bioaccumulation and biomagnification.

For **Atlantic saltmeadows** this includes the morphology of the saltmarsh creeks and pans

Restoration and recovery
As part of this objective it should be noted that; for the **estuaries** feature the structure and functions of the estuaries that have been damaged/degraded by the constraints of artificial structures such as flood banks, are restored.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,

- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery
As part of this objective it should be noted that; for the **reefs** feature the potential for expansion of the horse mussel *Modiolus modiolus* community off the north Llŷn coast is not inhibited.

5.2.5 Species Features

- Grey seal *Halichoerus grypus*
- Bottlenose dolphin *Tursiops truncatus*
- Otter *Lutra lutra*

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal** populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond

- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour

For **otter** there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

5.2.8 Restoration and recovery

As part of this objective it should be noted that for the **bottlenose dolphin** and **otter**, populations should be increasing.

5.3 Understanding the Conservation Objectives

5.3.1 A dynamic marine environment

The conservation objectives recognise and acknowledge that the features are part of a complex, dynamic, multi-dimensional environment. The structures, functions (environmental processes) and species populations of habitat features are inextricably linked. Marine habitats are complex ecological webs of species, habitat structure and environmental functions that vary dynamically in time and space. Variety and change in habitat structure is primarily driven by environmental and physicochemical factors, including water movement, water quality, sediment supply and prevailing weather conditions.

The species populations associated with these habitats also vary in time and space and this is, in part, a direct reflection of the variable habitat structure and dynamic environment. It is also the product of stochastic events and the great variation in survival and recruitment of species, particularly those with dispersive reproductive strategies.

Within the dynamism of habitats and species, there is also an element of stability and persistence, where species' and communities' populations as well as physical habitat structure show little overall long-term variation.

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These conservation objectives recognise and acknowledge that human activity has already modified and continues to modify habitats and species populations in various ways, to varying degrees and at varying spatial and temporal scales, either acutely or chronically. The conservation objectives do not aim to prevent all change to the habitat and species features, or to achieve an indefinable, abstract natural or pristine state, since these would be unrealistic and unattainable aspirations. Rather, they seek to prevent further negative modification of the extent, structure and function of natural habitats and species' populations by human activity and to ensure that degradation and damage to the features that is attributable to human activities or actions is prevented. Consequently, in order to meet the requirements of the Directives and ensure the site makes its appropriate contribution to conservation of biodiversity, the conservation objectives seek to:

- Encompass inherent dynamism rather than to work against it;
- Safeguard features and natural processes from those impacts of human activity that cause damage to the features through the degradation of their range, extent, structure, function or typical species;
- Facilitate, where necessary, restoration of features or components of features that are currently damaged or degraded and in unfavourable condition.

The term *degradation* is used to encompass damage or deterioration resulting only from such human activities or actions as have a detrimental effect on the feature. The magnitude of any degradation is dependent on the longevity and scale of the impact and the conservation importance of the species or habitats on which the impact occurs. This is influenced by:

- the type of human action, its nature, location, timing, frequency, duration and intensity;
- the species or habitats, and their intolerance and recoverability.

Outcomes arising from human action that are likely to be considered detrimental include such effects such as:

- permanent and long-term change of distribution or reduction in extent of a feature or feature component, or temporary modification or reduction sufficiently significant to negatively impact on biota or ecological processes;
- reduction in ecological function caused by loss, reduction or modification of habitat structural integrity;
- interference in or restriction of the range, variety or dynamism of structural, functional or ecological processes, *e.g.*: alteration of habitat structure, obstruction of tidal streams, chronic or acute thermal, salinity or suspended sediment elevations or reductions;
- hypertrophication or eutrophication;
- contamination by biologically deleterious substances;
- reduction in structure, function and abundance of species populations;
- change in reproductive capacity, success or recruitment of species populations;
- reduction in feeding opportunities of species populations

- reduction of health to a sub-optimal level, or injury, rendering the population less fit for, *inter alia,* breeding, foraging, social behaviour, or more susceptible to disease;
- increase in abundance and range of opportunist species through the unnatural generation of preferential conditions (*e.g.* organic enrichment), at the expense of existing species and communities.
- increase in abundance and range of non-native species.

Table 2 provides illustrative examples of specific changes and whether they would constitute degradation of the feature.

It is important to note that many human activities can either be beneficial (reduce or reverse detrimental human influence (*e.g.* improve water quality)), trivial (*e.g.* no significant and/or substantive long-term effect) or benign (no outcome) in terms of their impact on marine habitats and species.

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Degradation	Not Degradation
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Modification of a seabed community by organically rich effluent from a new sewage outfall.	Modification of a seabed community as a result of a reduction in organic material entering the sea from a sewage outfall.
Change in seabed community composition as a result of coastal engineering that has altered local wave exposure.	Change in seabed community composition as a result of a cliff fall, the debris from which has altered local wave exposure.
Change to the species composition of a seabed community as a result of an increase in scallop dredging intensity.	Change to the composition of a seabed community as a result of a reduction in scallop dredging intensity.
Permanent reduction of extent of sand and mud-flat as a result of new coastal development.	Permanent reduction of extent of sand and mud-flat as a result of long-term natural changes in sediment transport.
Changes in sediment granulometry as a result of beach recharge operations	Changes in sediment granulometry as a result of natural cliff fall and erosion

5.3.3 Use of the conservation objectives – Site management

The components of favourable conservation status detailed in the conservation objectives have different sensitivities and vulnerabilities to degradation by human activities. Conservation and protection of site features is provided by management, which should be based on levels of risk. The form of management and degree of protection necessary will vary spatially, temporally and from one feature component to another due to their differences in conservation importance and their sensitivity and susceptibility to change as a result of human action. Therefore it needs to be understood that these conservation objectives require a risk-based approach to the identification, prioritisation and implementation of management action.

Security of management is provided in part 6, sections 59 to 66, of the Conservation of habitats and Species Regulations 2017 (as amended), which require the assessment of plans and projects likely to have a significant effect on the site.

Where there is a potential for a plan or project to undermine the achievement of the conservation objectives, NRW will consider the plan/project to be likely to have a significant effect and require appropriate assessment. Unless it is ascertained, following an appropriate assessment, that a plan or project will not undermine the achievement of the conservation objectives, the plan/project should be considered as having an adverse effect on the integrity of the site[57].

Appropriate and secure management of activities may also be provided through a site management plan.

6. Advice as to operation which may cause deterioration or disturbance to the features

The range of different habitat types within each of the SAC's features is extremely wide and marine habitats and species populations are inherently dynamic. The range and scale of both natural and anthropogenic stressors on the marine habitats and species within the SAC are also very large. Human activities have the potential to impose stresses on each habitat's structure and function in many ways that result in acute, chronic or permanent impacts at different spatial scales. Species populations may also be affected at many levels e.g. physiological, genetic, single organism, population and groups of species.

Table 3 identifies where there is a potential for operations or activities to have an adverse effect on a feature or component of a feature exists. This does not imply a significant actual or existing causal impact. The potential for, and magnitude of, any effect will be dependent on many variables, such as the location, extent, scale, timing and duration of operations or activities, as well as proximity to features that are sensitive to one or more factors induced or altered by the operation. Due to the complexity of the possible inter-relationships between operations or activities and the features, the factors and effects listed in this table are the predicted most likely effects and are not exhaustive.

- The 'activity' column lists potentially damaging operations and gives an indication of their current known status within the SAC. Operations or activities marked with an asterisk (*) may have associated consents, licences, authorisations or permissions which are (or may be) plans or projects, within the meaning of Article 6 of the Habitats Directive. (The potential effects of the construction phase of operations marked with a hash (#) are included in the general operation 'construction'.
- The 'relevant factors' column (physical, chemical and biological factors) give an indication of the key mechanisms by which the operation or activity may cause an effect on each habitat feature.
- The 'most likely relevant component and effects' column indicates the most likely components of Favourable Conservation Status that might be affected by each operation or activity.

[57] Uncertainity should not result in a conclusion of no adverse effect on site integrity.

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 11: North Anglesey Marine SAC Conservation Objectives

EOR0730

Marine Energy Test Area

Rev: 01

May 29, 2019

Document Status

Version	Date	Authored by	Reviewed by	Approved by	Review date
Rev01	29/05/2019	AP	RDS	RDS	07/05/2019

Approval for issue

Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

This advice document is for the North Anglesey Marine/ Gogledd Môn Forol SAC (Figure 2) which is subject to protection under the Conservation of Habitats and Species Regulations 2017[5] and the Conservation of Offshore Marine Habitats and Species Regulation 2017[6] (collectively referred to as the Habitats Regulations). The advice is given in fulfilment of the duty of the Statutory Nature Conservation Bodies (SNCBs) under the Habitats Regulations to advise Relevant and Competent Authorities as to (a) the Conservation Objectives for the site; and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. The SNCBs aim to ensure that the Conservation Objectives are up-to-date, accessible and enable the assessment of the potential effects of plans and projects.

2 Responsibilities of Relevant and Competent Authorities

Competent Authorities (including those which are also Relevant Authorities) are required to exercise their functions to comply with the Habitats Regulations. Competent Authorities must, within their areas of jurisdiction, consider both direct and indirect effects on the site. This includes considering operations inside and outside the boundary of the SAC, if the impacts could affect the achievement of the site's Conservation Objectives. Decisions on management measures (e.g. the scale and type of mitigation) are the responsibility of the relevant regulatory or management bodies. These bodies will consider SNCB advice and hold discussions with the sector concerned, where appropriate. Where consent is required and the operation (if considered a plan or project) is likely to significantly affect a European Site, Article 6(3) of the Habitats Directive requires that an Appropriate Assessment (AA) is carried out. The AA is part of the “Habitat Regulations Assessment” (HRA), which is a case-specific assessment made in view of the Conservation Objectives for the affected site or sites. Each HRA requires case-specific advice from the SNCB but the assessment is the responsibility of the competent authority concerned.

The variability of harbour porpoise distribution and abundance within sites is in part due to their mobility and wide-ranging nature as well as natural and anthropogenic changes in habitat and prey. Relevant and Competent Authorities are not required to undertake any actions to ameliorate changes in the condition of the site if it is shown that the changes result wholly from natural causes. It is therefore important to contextualise any apparent deterioration of harbour porpoise presence in the site in terms of natural variability and the abundance and distribution patterns at the population level (i.e. MU).

3 Conservation Objectives for harbour porpoise SACs

3.1 The role of Conservation Objectives

Site level Conservation Objectives (COs) are a set of specified objectives that must be met to ensure that the site contributes in the best possible way to achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level (EC, 2012). Conservation Objectives constitute a necessary reference for:

- identifying any site-based conservation measures that may be required;
- carrying out HRAs of the implications of plans or projects.

The purpose of the HRA is to determine whether a plan or project adversely affects a site’s integrity. The critical consideration in relation to site integrity is not the extent or degree of an impact, or whether an impact is direct or indirect, but whether a plan or project, either individually or in combination with other plans or projects, affects the site’s ability to achieve its Conservation Objectives and therefore contribute to Favourable Conservation Status.

Harbour porpoise are protected everywhere in European waters under the provisions of the Habitats Regulations. The harbour porpoise in UK waters are considered part of a wider European population and the highly mobile nature of this species means that the concept of a ‘site population’ is not considered an appropriate basis for expressing Conservation Objectives for this species. Site based conservation measures will complement wider ranging measures that are in place for the harbour porpoise.

3.2 Background to Conservation Objectives

The Conservation Objectives are designed to help ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely. Therefore, the focus of the Conservation Objectives for harbour porpoise sites is on addressing pressures that affect site integrity and would include:

- killing or injuring harbour porpoise (directly or indirectly);
- preventing their use of significant parts of the site (disturbance / displacement);
- significantly damaging relevant habitats; or
- significantly reducing the availability of prey.

This document includes both a statement of the Conservation Objectives and explanatory text on their intent and interpretation specific to the site. The Objectives have been set taking account of European Commission guidance (EC, 2012). Further guidance on the management of specific pressures of harbour porpoise is being developed.

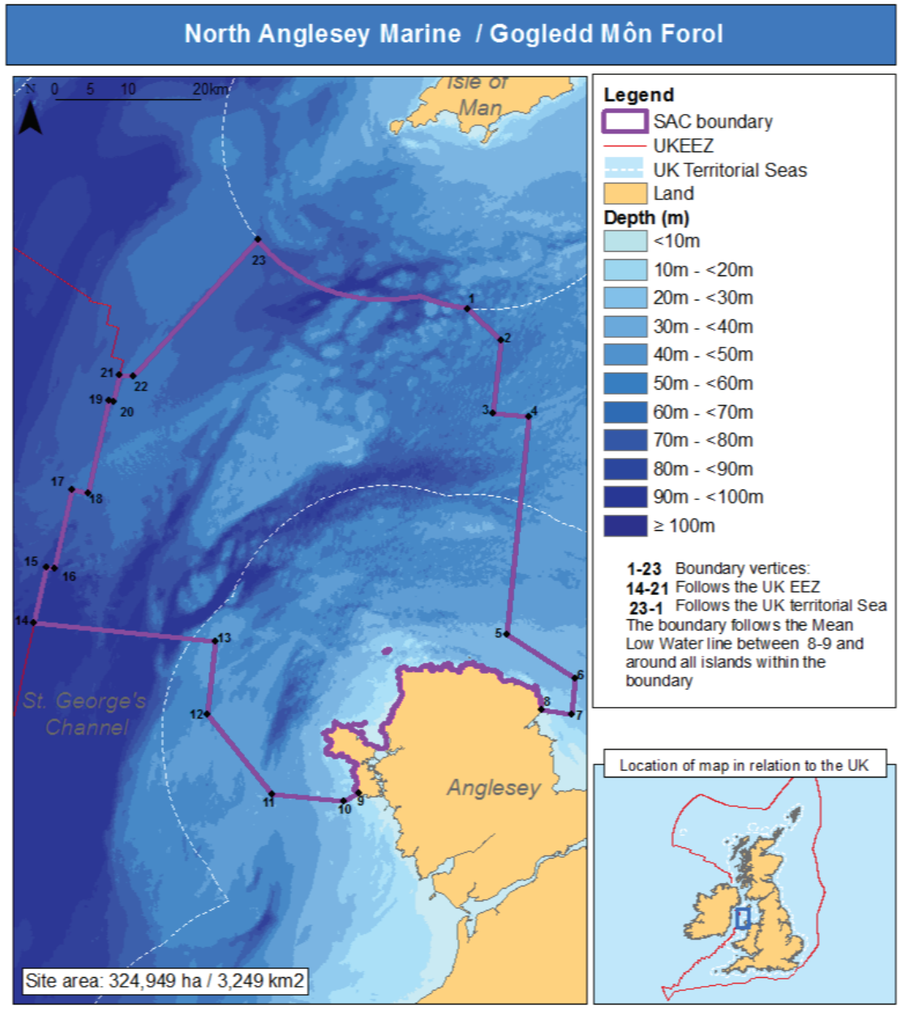
3.3 The North Anglesey Marine/ Gogledd Môn Forol SAC Conservation Objectives

The qualifying feature of the site is the Habitats Directive Annex II species:

- harbour porpoise (*Phocoena phocoena*)

Seasonal differences in the relative use of the site have been identified based on the analyses of Heinänen and Skov (2015). Harbour porpoise sightings data were modelled seasonally (Summer: April-September and Winter: October-March) for each MU. The outputs of this analysis were maps of areas by season and MU, that persistently contained elevated densities of harbour porpoises. These areas were used as the basis for site identification and as a consequence, sites may have seasonal components which should be considered in the assessment of impacts and proposed management. North Anglesey Marine / Gogledd Môn Forol (Figure 2) has been designated because of its importance to harbour porpoises in the summer months (April to September).

[5] http://www.legislation.gov.uk/uksi/2017/1012/contents/made
[6] http://www.legislation.gov.uk/uksi/2017/1013/contents/made



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Not to be used for navigation. © JNCC 02/2019. Coordinates displayed in WGS84 geographic coordination system.
Site area calculated using modified Europe Albers Equal Area Conic UK projection.

ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude
1	53° 51' 13.5" N	4° 35' 25.8" W	7	53° 23' 31.3" N	4° 12' 22.2" W	13	53° 23' 20.3" N	4° 57' 33.8" W	19	53° 38' 60" N	5° 17' 0" W
2	53° 49' 25.9" N	4° 30' 32.1" W	8	53° 23' 27.2" N	4° 16' 4.9" W	14	53° 21' 47.7" N	5° 20' 0.0" W	20	53° 38' 60" N	5° 16' 20.4" W
3	53° 44' 5.1" N	4° 29' 34.5" W	9	53° 14' 36.2" N	4° 36' 12.8" W	15	53° 25' 60" N	5° 20' 0" W	21	53° 40' 59.383" N	5° 16' 20.401" W
4	53° 44' 22.0" N	4° 25' 4.0" W	10	53° 13' 49.5" N	4° 37' 45.7" W	16	53° 25' 60" N	5° 19' 0" W	22	53° 41' 6.545" N	5° 14' 35.945" W
5	53° 28' 19.3" N	4° 22' 14.9" W	11	53° 13' 14.7" N	4° 46' 40.1" W	17	53° 32' 0" N	5° 19' 0" W	23	53° 52' 54.106" N	5° 2' 58.412" W
6	53° 26' 11.8" N	4° 12' 49.5" W	12	53° 17' 59.8" N	4° 56' 34.0" W	18	53° 32' 0" N	5° 17' 0" W			

Figure 2: The North Anglesey Marine / Gogledd Môn Forol Special Area of Conservation for harbour porpoise.

The Conservation Objectives for the site are:

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

1. Harbour porpoise is a viable component of the site;

2. There is no significant disturbance of the species; and

3. The condition of supporting habitats and processes, and the availability of prey is maintained.

Conservation Objective 1: Harbour porpoise is a viable component of the site

This SAC has been selected primarily based on the long-term, relatively higher densities of porpoise in contrast to other areas of the MU. The implication is that the SAC provides relatively good foraging habitat and may also be used for breeding and calving. However, because the number of harbour porpoise using the site naturally varies (e.g. between seasons), there is no exact number of animals within the site.

The intent of this objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the site. Specifically, this objective is primarily concerned with operations that would result in unacceptable levels of those impacts on harbour porpoises using the site. Unacceptable levels can be defined as those having an impact on the FCS of the populations of the species in their natural range. The reference population for assessments against this objective is the MU population in which the SAC is situated (IAMMWG, 2015).

Harbour porpoise is a European Protected Species (EPS) listed on Annex IV of the Habitats Directive and as such is protected under the Habitats Directive Article 12 and transposing regulations from deliberate killing (or injury), capture and disturbance throughout its range. In addition, Article 12 (4) of the Habitats Directive is concerned with incidental capture and killing. It states that Member States 'shall establish a system to monitor the incidental capture and killing of the species listed on Annex IV (all cetaceans). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned'. Site based measures should therefore be aligned with the existing strict protection measures in place throughout UK waters. Significant disturbance within or affecting the site is considered in the second conservation objective.

Conservation Objective 2: There is no significant disturbance of the species

Disturbance of harbour porpoise typically, but not exclusively, originates from operations that cause underwater noise including, as examples, seismic surveys, pile driving and sonar. Responses to noise can be physiological and/or behavioural. JNCC has produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise[7]. However, disturbance is primarily a behavioural response to noise and may, for example, lead to harbour porpoises being displaced from the affected area.

This SAC was identified as having persistently higher densities of harbour porpoises (Heinänen and Skov, 2015) compared to other areas of the MU. This is likely linked to the habitats within the site providing good feeding opportunities. Therefore, operations within or affecting the site should be managed to ensure that the animals' potential usage of the site is

[7] http://jncc.defra.gov.uk/page-4273

maintained. Disturbance is considered significant if it leads to the exclusion of harbour porpoise from a significant portion of the site. Specifically, draft SNCB advice / guidance for assessing the significance of noise disturbance to a site suggests:

Noise disturbance within an SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than: 1. 20% of the relevant area[8] of the site in any given day[9], and 2. an average of 10% of the relevant area of the site over a season[10,11].

Conservation Objective 3: The condition of supporting habitats and processes, and the availability of prey is maintained

Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat. The maintenance of supporting habitats and processes contributes to ensuring that prey is maintained within the site and is available to harbour porpoises using the site. Some evidence shows that the harbour porpoise has a high metabolic rate compared to terrestrial mammals of similar size (Rojano-Doñate et al. 2018) and high feeding rates (Wisniewska et al., 2016). The harbour porpoise is therefore thought to be a species that is highly dependent on a year-round proximity to food sources and its distribution and condition may strongly reflect the availability and energy density of its prey (Brodie 1995 in Santos & Pierce, 2003). The densities of porpoise using a site are likely linked to the availability (and density) of prey within the site. Harbour porpoise eat a variety of prey including gobies, sandeel, whiting, herring and sprat. However, the diet of porpoises when within the sites is not well known but is likely comparable to that in the wider seas.

There are several operations (Table 2) which potentially affect the achievement of this Conservation Objective. Whilst some plans/projects are unlikely to have a significant effect alone, an effect might become significant when considered in combination with other plans/projects and against the background of existing activities/pressures on the site. Further work is needed to assess historic, existing and planned levels of plans/projects in the sites and to better understand their impacts on the habitats and prey within the sites.

4 Advice on Operations

4.1 Purpose of advice

This section details the activities specifically occurring within or close to the North Anglesey Marine/ Gogledd Môn Forol SAC that would be expected to impact the site; this is known as Advice on Operations. Initial assessments were conducted at a UK scale, with subsequent

[8] The relevant area is defined as that part of the SAC that was designated on the basis of higher persistent densities for that season (summer defined as April to September inclusive, winter as October to March inclusive).

[9] Applicable only in Habitats Regulations Assessments (HRA) due to impracticality of daily noise limit management of activities, but retrospective compliance analysis advised

[10] Summer defined as April to September inclusive, winter as October to March inclusive

[11] For example, a daily footprint of 19% for 95 days would result in an average of 19x95/183 days (summer) =9.86%

MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Habitat Regulations Assessment

Appendix 12: Skomer, Skokholm and the sea off Pembrokeshire SPA Conservation Objectives

EOR0730

Marine Energy Test Area

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May 29, 2019

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Jessica Hooper		2019-05-29

Prepared by:

RPS Energy Ltd.

Prepared for:

Marine Energy Wales

Skomer, Skokholm and the seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro potential Special Protection Area: Draft conservation objectives

December 2015

Crynodeb a Chefndir

Mae'r ddogfen yma yn cyflwyno amcanion cadwraeth drafft ar gyfer Ardal Gwarchodaeth Arbennig arfaethedig Skomer, Skokholm and the seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro.

Mae'r AGA arfaethedig yn cael ei gynnig fel ymestyniad morol pellach i AGA presennol Skokholm and Skomer, a ddynodwyd (neu 'ddosbarthwyd') felly yn gyntaf yn 1982, a'i ymestyn yn ddiweddarach yn 2014 i gynnwys rhai ardaloedd morol cyfagos. Mae'r AGA presennol yno er mwyn amddiffyn poblogaethau bridio nifer o rywogaethau o adar môr, gan gynnwys aderyn drycin Manaw *Puffinus puffinus*, y pâl *Fratercula arctica*, pedryn drycin *Hydrobates pelagicus* a'r wylan gefnddu leiaf *Larus fuscus*. Mae hefyd yn amddiffyn poblogaethau bychain yr ynysoedd o frain coesgoch *Pyrrhocorax pyrrhocorax* a thylluanod clustiog *Asio flammeus*. Mae'r ymestyniad morol arfaethedig, sy'n cynnwys rhanbarth o fewn cyfyngiad 12 milltir dyfroedd tiriogaethol Cymru yn ogystal â rhanbarth alltraeth y tu hwnt i'r cyfyngiad 12 milltir, yn cynrychioli poethfan ddwys i adar drycin Manaw ac adar pâl o fewn y DU. Oherwydd agosrwydd y boethfan at AGA presennol Skokholm and Skomer a'r nythfeydd bridio sylweddol i'r ddwy rywogaeth yno, y cynnig yw i ddynodi'r ardal forol yn estyniad i'r AGA presennol.

Cafodd y ddogfen hon ei pharatoi fel rhan o ystod o wybodaeth gefndirol er mwyn cefnogi ymgynghoriad cyhoeddus ynghylch cynigion i restru amryw o ardaloedd morol newydd o amgylch Cymru yn Ardaloedd Gwarchodaeth Arbennig ac yn Ardaloedd Cadwraeth Arbennig (ACA). Caiff ei darparu er gwybodaeth yn unig ac nid yw'n destun yr ymgynghoriad. Mae map o'r AGA arfaethedig ar gael ar y dudalen ymgynghoriadau ar wefan CNC: www.cyfoethnaturiol.cymru/mn2k

Mae AGA yn anghenraid yn ôl Cyfarwyddeb yr UE ar Warchod Adar Gwyllt yn 2009 (deddfwyd yn wreiddiol yn 1979). Maent, ynghyd ag ACA, a ddynodwyd yn sgil Cyfarwyddeb yr UE ar Gynefinoedd a Rhywogaethau yn 1992, yn cael eu galw'n safleoedd Ewropeaidd, neu'n safleoedd morol Ewropeaidd pan maent yn cynnwys ardaloedd morol.

Dan Reoliad 35 Rheoliadau Gwarchod Cynefinoedd a Rhywogaethau 2010, fel y'i diwygiwyd, mae gofyn i CNC roi cyngor ynghylch yr amcanion cadwraeth ar gyfer safleoedd morol Ewropeaidd yn nyfroedd Cymru, ac unrhyw weithredoedd a all achosi dirywiad neu amharu ar nodweddion y safleoedd. Gelwir hyn yn aml yn 'cyngor Rheoliad 35'. Mae gan Cyd-bwyllgor Cadwraeth Natur swyddogaeth

gyfatebol mewn perthynas â dyfroedd môr mawr y DU dan Reoliad 18 Rheoliadau Cadwraeth Forol Alltraeth 2007. Mae ar CNC gyfrifoldeb i gynnig cyngor Rheoliad 35 unwaith y caiff AGA ei ddynodi (neu 'ei ddosbarthu') yn ffurfiol gan y Gweinidogion Cymreig. Mae cyfrifoldeb cyfatebol Cyd-bwyllgor Cadwraeth Natur dros safleoedd alltraeth dan Reoliad 19 Rheoliadau 2007 yn codi pan gaiff safle ei gynnwys ar gofrestr y safleoedd morol alltraeth Ewropeaidd, sy'n digwydd unwaith caiff AGA ei ddosbarthu felly gan Ysgrifennydd Gwladol y DU.

Mae'r amcanion cadwraeth ar gyfer AGA presennol Skokholm and Skomer yn cael eu nodi yng nghynllun rheoli craidd yr AGA a gyhoeddwyd gan CNC. Mae'r amcanion hyn yn parhau yn weithredol nes i CNC a Cyd-bwyllgor Cadwraeth Natur yn eu tro gyhoeddi 'cyngor Rheoliad 35/18' diwygiedig ar gyfer estyniad/ailddosbarthiad yr AGA, pe dewisai Gweinidogion Cymreig a'r DU ailddosbarthu ac ymestyn y safle. Mae'r cynllun rheoli ar gael o: https://naturalresources.wales/media/674159/Skomer[1].Skokholm%20management%20plan%2007%20Cymraeg.pdf

Os oes gennych unrhyw gwestiynau ynghylch y ddogfen, a fyddech cystal ag e-bostio morol.n2k@cyfoethnaturiolcymru.gov.uk, neu roi galwad ffôn i ni ar 0300 065 3000. Os yw eich ymholiad yn ymwneud yn bennaf â dyfroedd alltraeth, cysylltwch â Cyd-bwyllgor Cadwraeth Natur os gwelwch yn dda drwy e-bostio seabirds@jncc.gov.uk.

Summary and background

This document presents draft conservation objectives for Skomer, Skokholm and the seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro potential Special Protection Area (pSPA).

The pSPA is being proposed as a further marine extension to the existing Skokholm and Skomer SPA, which was first designated (or 'classified') in 1982, and subsequently extended in 2014 to include some adjacent marine areas. The existing SPA is designated to protect breeding populations of a number of species of seabirds, including Manx shearwater *Puffinus puffinus,* Atlantic puffin *Fratercula arctica*, European storm petrel *Hydrobates pelagicus* and lesser black-backed gull *Larus fuscus*. It also protects the islands' small populations of chough *Pyrrhocorax pyrrhocorax* and short eared owl *Asio flammeus.* The proposed marine extension, which includes both an area within the 12 mile limit of Welsh Territorial waters and an area of offshore waters beyond the 12 mile limit, represents a density 'hotspot' for Manx shearwater and Atlantic puffin in a UK context. Because of the proximity of this hotspot to the existing Skokholm and Skomer SPA with its major breeding colonies of these two species, the proposal is to designate the marine area as an extension to the existing SPA.

This document has been prepared as part of a range of background information in support of a public consultation over proposals to designate a number of new marine areas around Wales as SPAs and Special Areas of Conservation (SACs). It is provided for information only and is not the subject of the consultation. A map of the pSPA is available on the consultation page on the NRW website: www.naturalresources.wales/mn2k

SPAs are a requirement of 2009 EU Wild Birds Directive (originally enacted in 1979). Together with SACs, which are designated under the 1992 EU Habitats and Species

Directive, they are referred to as European sites, or European marine sites where they include marine areas.

Under Regulation 35 of the Conservation of Habitats and Species Regulations 2010, as amended, NRW is required to issue advice as to the conservation objectives for European marine sites in Welsh waters, and any operations which may cause deterioration or disturbance to the sites' features. This is often called 'Regulation 35 advice'. JNCC has a corresponding duty in relation to UK offshire waters under Regulation 18 of the Offshore Marine Conservation Regulations 2007. NRW's duty to issue Regulation 35 advice arises once an SPA is formally designated (or 'classified') by the Welsh Ministers. JNCC's corresponding duty in relation for offshore sites under Regulation 18 of the 2007 Regulations arises when a site is included in the register of European offshore marine sites, which happens once the SPA has been classified by the UK Secretary of State.

The conservation objectives for the existing Skokholm and Skomer SPA are set out in the core management plan for the SPA published by NRW. These objectives continue to apply until in due course NRW and JNCC have issued revised 'Regulation 35/18 advice' for the extended/reclassified SPA, should Welsh and UK Ministers decide to reclassify and extend the site. The management plan is available from:
http://naturalresources.wales/media/674164/Skomer[1].Skokholm%20management%20plan%2007.pdf

If you have any questions about this document, please email marine.n2k@naturalresourceswales.gov.uk, or call us on 0300 065 3000. If your query is mainly in relation to offshore waters, please contact JNCC at seabirds@jncc.gov.uk.

Draft conservation objectives

Feature 1: Breeding population of storm petrel *Hydrobates pelagicus*
Feature 2: Breeding population of lesser black-backed gull *Larus fuscus*
Feature 3: Breeding population of Manx shearwater *Puffinus puffinus*
Feature 4: Breeding population of Atlantic puffin *Fratercula arctica*
Feature 5: Breeding seabird assemblage

Please note that draft conservation objectives for other, terrestrial qualifying species of the SPA are not included here (namely short-eared owl *Asio flammeus* and chough *Pyrrhocorax pyrrhocorax*)

Feature 1: Breeding population of storm petrel *Hydrobates pelagicus*	
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.	The breeding population of storm petrel should be stable or increasing. The aim, across the 2 islands is for at least 3500 pairs, with this number to be stable or increasing.
The distribution of the	The distribution of this species within the site should not

population should be being maintained, or where appropriate increasing.	be constrained by anthropogenic factors, including disturbance by the public and activities leading to possible loss of suitable nesting sites.
There should be sufficient habitat, of sufficient quality, to support the population in the long term.	The foraging habitat of this species should be stable or increasing in terms of its area, and its quality should remain unaffected by anthropogenic factors. There should be no contraction of the distribution of nesting sites as a result of anthropogenic factors.
Factors affecting the population or its habitat should be under appropriate control.	Breeding success of this species should remain unaffected by negative human influence. Factors affecting the species within the site should be under control

Feature 2: Breeding population of lesser black-backed gull *Larus fuscus*	
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.	The breeding population size of lesser black-backed gull should be stable or increasing, aiming for at least 20,300, with a breeding productivity rate and an adult survival rate that allows this number to be maintained/increased.. Colonies of this species must not be lost as a result of anthropogenic influence.
The distribution of the population should be being maintained, or where appropriate increasing.	The distribution of this species within the site should not be constrained by anthropogenic factors. Reductions in the range of this species can only be acceptable if there is significant risk of detriment, to the FCS of priority features of this SPA.
There should be sufficient habitat, of sufficient quality, to support the population in the long term.	The breeding and foraging habitat of this species should be stable or increasing in terms of its area, and its quality should remain unaffected by anthropogenic factors.
Factors affecting the population or its habitat should be under appropriate control.	There should be no mammalian land predators present in the SPA, and control measures should be in place to ensure that accidental introduction does not take place. Access beyond designated footpaths, should be under appropriate control. Factors affecting the species within the site should be under control

Feature 3: Breeding population of Manx shearwater *Puffinus puffinus*	
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.	The breeding population of Manx shearwater should be stable or increasing with no measured decrease in numbers (based on a population count of 150,968), based on annual study plots.
The distribution of the population should be being maintained, or where appropriate increasing.	The distribution of this species within the site should not be constrained by anthropogenic factors, including disturbance of nesting sites by the public and activities leading to possible loss of suitable nesting sites.
There should be sufficient habitat, of sufficient quality, to support the population in the long term.	The breeding and foraging habitat of this species should be stable or increasing in terms of its area, and its quality should remain unaffected by anthropogenic factors.
Factors affecting the population or its habitat should be under appropriate control.	Rafting birds should remain unaffected by boat use and other anthropogenic factors; appropriate codes of conduct must be followed by all visitors and craft surrounding the islands. Factors affecting the species within the site should be under control

Feature 4: Breeding opulation of Atlantic puffin *Fratercula arctica*	
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.	The breeding population of Atlantic puffin should be stable or increasing with an aim of 9500 individuals being achieved.
The distribution of the population should be being maintained, or where appropriate increasing.	The distribution of this species within the site should not be constrained by anthropogenic factors. There should be no contraction of the distribution of nesting sites as a result of anthropogenic factors.
There should be sufficient habitat, of sufficient quality, to support the population in the long term.	The breeding and foraging habitat of this species should be stable or increasing in terms of its area, and its quality should remain unaffected by anthropogenic factors.
Factors affecting the population or its habitat should be under appropriate control.	There should be no mammalian land predators present in the SPA, and control measures should be in place to ensure that accidental introduction does not take place. Access beyond designated footpaths, should be under appropriate control.

	Rafting birds should remain unaffected by boat use and other anthropogenic factors; appropriate codes of conduct must be followed by all visitors and craft surrounding the islands. Factors affecting the species within the site should be under control

Feature 5: Breeding seabird assemblage	
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.	The breeding populations should be stable or increasing based on a total population of 394,260.
The distribution of the population should be being maintained, or where appropriate increasing.	The distribution of these species within the site should not be constrained by anthropogenic factors, including disturbance by the public and activities leading to possible loss of suitable nesting sites.
There should be sufficient habitat, of sufficient quality, to support the population in the long term.	The breeding and foraging habitat of these species should be stable or increasing in terms of their area, and its quality should remain unaffected by anthropogenic factors. There should be no contraction of the distribution of nesting sites as a result of anthropogenic factors.
Factors affecting the population or its habitat should be under appropriate control.	There should be no mammalian land predators present in the SPA, and control measures should be in place to ensure that accidental introduction does not take place. Access beyond designated footpaths, should be under appropriate control. Rafting birds should remain unaffected by boat use and other anthropogenic factors; appropriate codes of conduct must be followed by all visitors and craft surrounding the islands. Factors affecting these species within the site should be under control