# PEMBROKE DOCK INFRASTRUCTURE

Habitat Regulation Assessment Screening and Report to Inform Appropriate Assessment

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# 1 INTRODUCTION

1.1.1.1 The proposed development, which is known as Pembroke Dock Infrastructure (PDI), will create a flexible port-related industrial area capable of meeting the needs of the modern blue economy and is the subject of an outline planning application for the erection of buildings, extension to the slipway and associated development as well as a Marine Licence application to the Natural Resources Wales Marine Licensing Team (NRW-MLT).

1.1.1.2 As part of the marine licence and planning applications for the proposed development it has been identified that an Environmental Statement (ES) is required. A Scoping Report to inform the scope of the ES identified potential Natura 2000 sites that could be impacted by the proposal. The response issued by NRW-MLT stated that it would require sufficient information to inform a Habitat Regulation Assessment in accordance with Habitat Conservation of Habitats and Species Regulations (2010) to be submitted along with the ES.

1.1.1.3 For the purposes of the document references made to Pembroke Port is defined as the area of Milford Haven Waterway (MHW) adjacent to the site located between Carr Jetty and Ferry Terminal.

## 1.2 Purpose of this Report

1.2.1.1 This document has been produced to inform the Habitat Regulations Assessment (HRA) process for the proposed development. Where a project that is not directly connected to, or necessary for the management of a European Site, is likely to have a significant effect on the Conservation Objectives (CO) of the site (directly, indirectly, alone or in-combination with other plans or projects) then an Appropriate Assessment (AA) must be undertaken by the Competent Authority in accordance with the requirements of Regulation 61 of the Conservation of Habitats and Species Regulations (2010) (the Habitats Regulations). The AA must be carried out before consent or authorisation can be given for the project.

1.2.1.2 This report provides both an HRA Screening and Report to Inform Appropriate Assessment (RIAA) and has been prepared to provide Pembroke County Council, as the Local Planning Authority, NRW-MLT, as the Consenting Authority for the Marine Licence, ("the Competent Authorities") in consultation with Milford Haven Port Authority as the competent authority for all proposed major works within Milford Haven Port jurisdiction with the information necessary to assess the works and development proposed for the proposed project and to determine whether there will be an adverse effect on the integrity of any European Site(s) in view of their COs from this project. The RIAA, as part of the in-combination assessment (Section 9.5) also provides a full assessment of the implications of the proposed development with other relevant plans/projects, on European sites.

1.2.1.3 As the proposed development is the subject of an Environmental Impact Assessment (EIA), reference is also made to relevant chapters of the ES where appropriate.

1.2.1.4 A detailed project description including proposed design and associated construction and operation activities for the project is provided in Chapter 2 of the ES which should be referred to in conjunction within this document.

## 1.3 Structure of the Report

1.3.1.1 The following chapters in this HRA Screening and RIAA describe:

- Chapter 2: Consultation;
- Chapter 3: Habitats Regulations Assessment process;
- Chapter 4: Evidence base on which the document has been developed;
- Chapter 5 Method to inform Appropriate Assessment;
- Chapter 6: Screening: Designated site qualifying interest features and Screening of Likely Significant Effects
- Chapter 7: Appropriate Assessment; and
- Chapter 8: Effects on Site Integrity.

# 2 CONSULTATION

2.1.1.1 The EIA Scoping Report (Document 180615 R JPW1115 DW EIA SR v3, RPS, 2018) that was submitted to NRW-MLT for consultation in June 2018 identified that the Conservation Objectives (COs) of the qualifying features of the following designated sites could potentially be affected by the project.

- Pembrokeshire Marine/ Sir Benfro Forol Special Area of Conservation (SAC);
- West Wales Marine / Gorllewin Cymru Forol cSAC;
- Afonydd Cleddau/ Cleddau Rivers SAC; and
- Pembrokeshire Bat Sites and Bosherton Lakes SAC.

2.1.1.2 As part of the Scoping Report certain qualifying features of each designated site were scoped out for further assessment due to the lack of receptor pathway. The features scoped out of the assessment, which have not been discussed further in this report, include the following:

- Pembrokeshire Marine SAC;
  - Annex I habitats:
    - Large shallow inlets and bays;
    - Submerged or partially submerged sea caves,
    - Sandbanks which are slightly covered by sea water at all time (all located outside Milford Haven).
    - Coastal lagoons and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).
  - Annex II species:
    - Shore dock (*Rumex rupestris*).
- Cleddau Rivers SAC;
  - Annex I habitats:
    - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation;
    - Active raised bogs;
    - Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno- Padion, Alnion incanae, Salicion albae*)
  - Annex II species:
    - Bullhead (*Cottus gobio*)
    - Brook lamprey (*Lampetra planeri*)

2.1.1.3 No comments were provided by NRW-MLT with respect to identified designated sites and the features identified to be scoped out for further assessment. The sites and features identified

as requiring assessment in the Scoping Report have therefore been carried forward in this document.

# 3 THE HABITAT REGULATION ASSESSMENT PROCESS

## 3.1 Legislative Context

3.1.1.1 The EU Habitats Directive (92/43/EEC), on the conservation of natural habitats and of wild fauna and flora, together with the Wild Birds Directive (2009/147/EC) aim to protect and improve Europe's most important habitats and species. These Directives are transposed into UK law by The Conservation of Habitat and Species Regulations 2017 (the Habitats Regulations')). Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are protected under the Habitats Regulations.

3.1.1.2 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 afforded the same level of protection as SACs and SPAs. As a matter of policy, the UK Government also affords sites going through the formal designation process i.e. potential SPAs (pSPAs), candidate and potential cSACs and pSACs, Sites of Community Importance (SCIs) and potential Ramsar sites the same level of protection. Commonly, such sites are labelled as 'European sites'.

## 3.2 The Process

3.2.1.1 Regulation 63 of the Habitats Directive requires that a Competent Authority, before deciding to authorise a plan or project, must consider whether the plan or project is likely to have a significant effect on a European site, either alone, or in combination with other plans or projects. If it is considered that such an effect is likely, the competent authority must then undertake an 'Appropriate Assessment' of the implications of the plan or project for the site, in view of the site's Conservation Objectives (COs).

3.2.1.2 Regulation 63 further makes clear that in light of the conclusions of such an Appropriate Assessment, the Competent Authority (CA) 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 agreement 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). 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.

3.2.1.3 Regulation 63 further makes it clear that the person applying for the authorisation of the plan or project must provide such information as the CA 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 and draws upon detailed assessment information within the ES which accompanies the applications for consent.

3.2.1.4 This document provides information on the methodology followed in carrying out the HRA Stage 1: Screening and Stage 2: Appropriate Assessment for Pembroke Dock Marine on Natura 2000 sites. In so far as there may be in combination effects on designated sites associated with the proposed development, these must be considered together with the effects of other relevant projects and plans.

# 4 EVIDENCE BASE

4.1.1.1 The desk studies and ecological surveys undertaken are summarised below and have been used to inform this HRA Screening and RIAA report.

- Historic mapping of intertidal and subtidal habitats within Milford Haven Waterway including mapping of intertidal and subtidal habitats (Brazier *et al.*, 2007; data from the Mapping European Seabed Habitats (MESH) mapping programme (EUSeaMap, 2016) and data from http://magic.defra.gov.uk;
- Background information on the features of SACs outlined in NRW supporting documents for those designated sites;
- SAC Annex I feature maps such as the Lle Geo-Portal; and
- Small Cetaceans in the North Sea (SCANS) surveys (SCANS II and III) (Hammond *et al.*, 2006; 2017).

# 5 ASSESSMENT METHOD

5.1.1.1 In accordance with the Planning Inspectorate Guidance Note Ten (The Planning Inspectorate, 2017; Version 8) and the Habitat Regulations Assessment Handbook (Tylesdsley and Chapman, 2013), there are several stages to the Habitat Regulation Assessment (HRA) process:

- Stage 1 – Screening
    - Determine the European (Natura 2000) sites and features that have the potential for likely significant effect (LSE) from the project alone or in-combination with other plans and projects and provide information on identified European sites and their Conservation Objectives (COs); and
    - Determine project activities that have the potential for LSE on identified European sites and their features.
- Stage 2 - Appropriate Assessment
    - Where an LSE has been identified on a European site in Stage 1, consider whether those effects will adversely affect the integrity of the European site in light of its COs; and
    - For identified adverse effects on the integrity of the site provide suitable mitigation that will ensure that no adverse effect to site integrity can be concluded.

5.1.1.2 If Stage 2 concludes that the project will have an adverse effect on the integrity of the European site(s), or is inconclusive, then Stage 3 and 4 of the HRA process are triggered; that is consideration of alternatives, compensatory measures and whether the project is justified by Imperative Reasons of Overriding Public Interest (IROPI) is required.

## 5.2 Stage 1 - Screening

5.2.1.1 Prior to undertaking the screening exercise, qualifying interest features for the assessment were identified through consultation with NRW as part of the Scoping process.

5.2.1.2 Information, including current condition, on each of the European sites' features have been provided through review of information and data sources that were undertaken to identify the extent of qualifying features within the study area.

5.2.1.3 The screening assessment then identified project activities that could cause LSE to the features and/or COs of each identified European site.

5.2.1.4 Activities from the project were identified that could impact on European site features and COs by assessing the potential for an impact pathway on the features of the designated site. Direct disturbance, discharges, and emissions from the project were considered.

5.2.1.5 Through the assessment of each impact pathway, project activities or features of each site were screened out according to whether an LSE from the activity would occur on identified features.

5.2.1.6 The screening assessment was based on sound reasoning and within the context of best available knowledge on the various ways in which the proposed project could impact on the interest features of the relevant European sites. If it cannot be concluded with confidence that LSE will not occur, then under the precautionary principle, it is assumed that the issue requires more detailed consideration and is progressed to Stage 2.

## 5.3 Stage 2 - Appropriate Assessment

5.3.1.1 For site qualifying features and impact pathways that were not screened out as part of the Stage 1 Screening, further assessment was undertaken. The information provided for this stage of the HRA included review of specialist studies and information (as contained within the ES) to determine whether a conclusion of no adverse effect to the identified European sites as a result of the project could be determined.

5.3.1.2 This Report to Inform the Appropriate Assessment (RIAA) should therefore be read in conjunction with the following chapters of the ES issued alongside this document:

- Chapter 2 – Project Description;
- Chapter 6 – Marine Environment;
- Chapter 16 – Biodiversity; and
- Appendix 6.2 – Underwater Noise Modelling Report.

5.3.1.3 This report does not aim to repeat information provided elsewhere within the ES. Therefore, where information is discussed in more robust detail elsewhere, a summary of the relevant information has been provided along with the reference to the appropriate sections of the relevant ES chapters and/or appendices.

5.3.1.4 To support the assessment, underwater noise modelling was undertaken to predict the magnitude of underwater noise emissions from piling activities on European site features. Peer reviewed scientific information has been used to assess the tolerance of site features to the identified impact, and a recommendation to the overall potential for adverse effect is provided.

5.3.1.5 An assessment of in-combination effects was then undertaken to determine if there were any other plans and projects that could impact the site features in-combination with the proposed project.

5.3.1.6 Following assessment of each impact, a judgement was undertaken to determine whether the conservation objectives for each qualifying feature will be maintained in a favourable condition.

5.3.1.7 If it was identified that effects from the project following completion of Stage 2 could not be assessed as having no adverse effect, then mitigation has been proposed to minimise the identified effect to a suitable level (i.e. avoiding an adverse effect on integrity).

# 6 STAGE 1: SCREENING

## 6.1 Qualifying Interest Features

6.1.1.1 The following designated sites were identified for consideration in this RIAA (Figure 6.1):

- Pembrokeshire Marine/ Sir Benfro Forol SAC;
- West Wales Marine / Gorllewin Cymru Forol SAC;
- Afonydd Cleddau/ Cleddau Rivers SAC; and
- Pembrokeshire Bat Sites and Bosherston Lakes SAC.

6.1.1.2 Sections 6.1.2 to 6.1.5 provide a description of the qualifying features of each designated site supported with additional data and information from surveys undertaken to inform baseline description for the project and the conservation objectives for each designated site. Features described do not include those that have been screened out in the Scoping Report (paragraph 2.1.1.1 and 2.1.1.2).

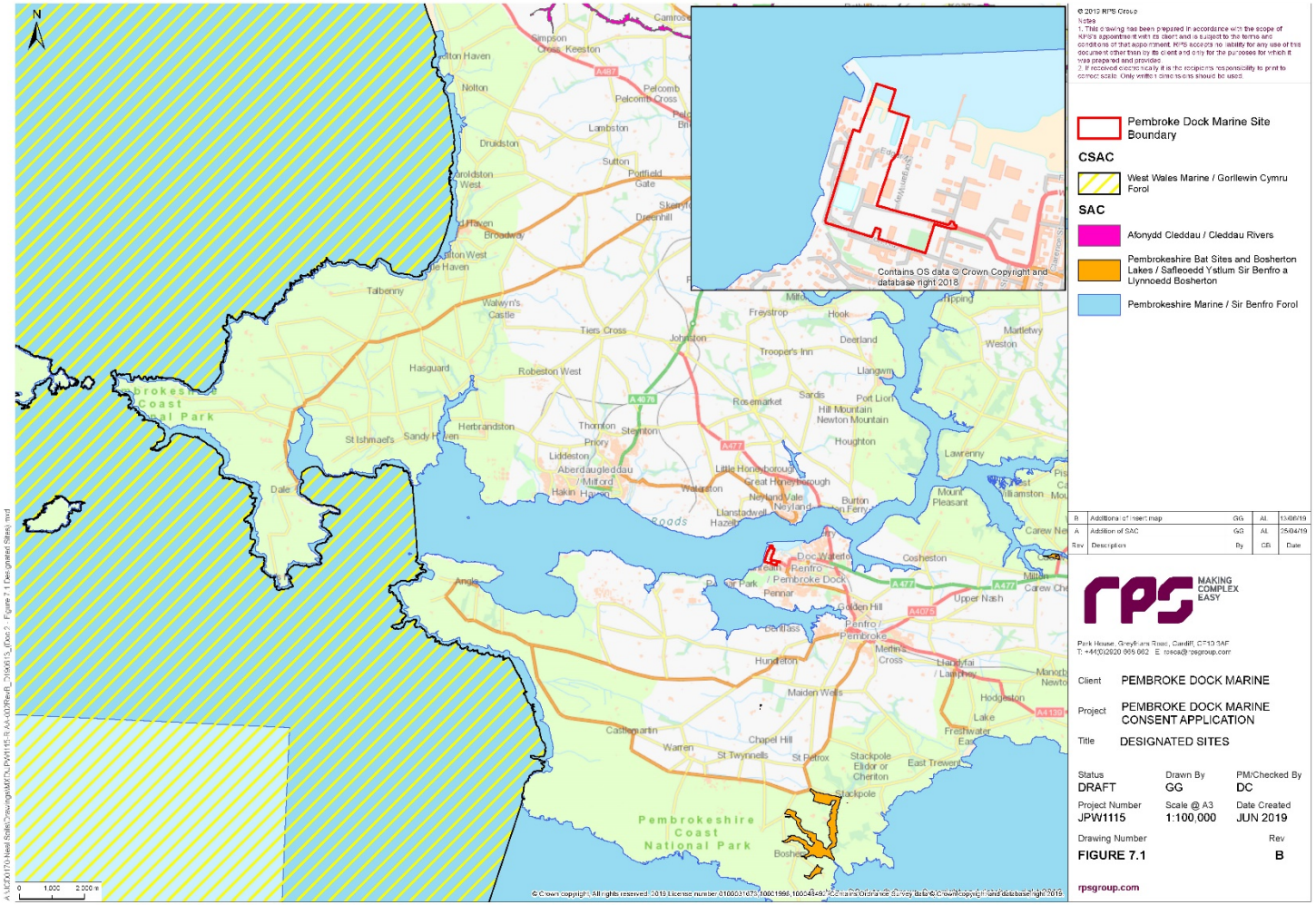


**Figure 6.1: Designated sites identified within vicinity of the site.**

### 6.1.2 Pembrokeshire Marine/ Sir Benfro Forol SAC

#### Site Description

6.1.2.1 The Pembrokeshire Marine SAC, found adjacent to Pembroke Port, 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 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.

6.1.2.2 The site has a rich and complex geology. The northern part is dominated by both sedimentary and igneous Precambrian, Cambrian and Ordovician rocks; the southern part by old red sandstone and carboniferous rocks, notably the limestone block of the Castlemartin coast, and the Silurian volcanics of the Marloes Peninsula, Skomer and offshore rocks and islands.

6.1.2.3 There is an extremely wide range of sediments within the SAC from the very fine muds in sheltered areas of the Milford Haven Waterway (MHW), through sands and gravels, to consolidated and unconsolidated pebbles and cobbles in deep subtidal areas subject to strong currents and storm events.

6.1.2.4 The range and times of high and low water varies considerably throughout the site. The maximum mean spring tide range at Dale Roads, in the entrance to MHW, is around 7.8 m compared to around 4.4 m in Ramsey Sound. This creates an extensive intertidal zone with broad and high shores.

6.1.2.5 Strong tidal streams are a characteristic of the SAC, particularly around the islands, islets and headlands and narrows, including parts of the MHW, with maximum speeds reaching 5 m/sec through Jack and Ramsey Sounds during spring tides. There are huge variations in the tidal stream patterns and timing over very short distances. Areas of weaker and negligible tidal streams are widespread, particularly in embayments. There are also unusual tidal conditions, such as the modified salt wedge in MHW.

6.1.2.6 Suspended particulate concentrations are highly variable with season, wave action, tidal conditions and freshwater discharge. As a consequence, water clarity and seabed and water column light intensity are also spatially and seasonally variable. The site is very wind exposed, but variable depending on location and topography.

6.1.2.7 There is a complex, dynamic salinity regime within MHW. Nutrient and contaminant levels are variable throughout the site. MHW has high levels of nutrients. Highly dynamic water movement maintains levels of many contaminants below detectable limits. Available data suggests water column dissolved oxygen is generally 100% saturation though recent survey data suggests that parts of MHW suffer levels at least as low as 86%.

## Qualifying Features

6.1.2.8 The following key features from the Habitats Directive Annex I habitats list have been identified within the MHW and the zone of influence of the proposed development:

- **Estuaries:** Associated with the wide range of environmental conditions, particularly seabed substrates, tidal streams and salinity gradients, there is a wide diversity of communities and species. The species-richness of sediment communities throughout MHW is high. The SAC includes smaller estuaries entering the MHW, and wide intertidal mudflats with rich and productive invertebrate annelid and mollusc communities, occurring in 'pills' (creeks).
- **Reefs**: Extensive areas of sublittoral rocky reef stretch offshore from the west Pembrokeshire coast and between the Pembrokeshire islands and many small rocky islets. Reefs also extend through MHW and into the variable salinity conditions of the Daugleddau estuary. The shallower and south-west-facing rocky reefs are exposed to severe wave action, while many others are extremely wave-sheltered. Reef habitat diversity is dependent on a range of variables, including aspect, slope, topography and water quality. More sheltered reefs, including those exposed to low salinities and high turbidity, typically support diverse and species-rich sponge and ascidian-dominated communities.
- **Mudflats and sandflats not covered by seawater at low tide:** Intertidal mudflats and sandflats are widespread in the SAC, occurring between low and high tide marks. They are distributed throughout embayments, inlets, estuaries and on the open coast within the site. Tributary estuaries and other wave-sheltered areas in the MHW are characterised by extensive upper, mid and low shore mudflats, supporting extensive pioneer salt-marsh and Atlantic salt-meadows. Moderately sheltered embayments in the lower MHW have extensive shore flats with either sloping or constrained mid-upper shores similar to open coast embayments, or grading into adjacent tributary estuary mudflats.

6.1.2.9 The following key features that apply to this RIAA from the Habitats Directive Annex II species list include the grey seal *Halichoerus grypus*.

6.1.2.10 The UK population of grey seal represents about 38% of the world population and 83% of the EU population. 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. The south-west Wales population size based on pup counts and has been estimated at approximately 5000 individuals. Rocky coast beaches, coves and caves along most of the coast provides pupping habitat but preferred sites tend to be the most secluded, sheltered from heavy wave action and accessible by females at all phases of the tide. Seals are generalist feeders, foraging mainly on the sea bed, taking a wide variety of prey including sandeels, gadoids (cod, whiting,

haddock, ling), and flatfish (plaice, sole, flounder, dab). Historic data suggests that grey seals may occasionally occur in low numbers within the MHW and near to Pembroke Port.

6.1.2.11 The following Habitats Directive Annex II species have also been identified as features of the SAC that are of importance in the unit but are not the main focus of management or monitoring. These features will benefit from management for the key feature(s) identified in the unit:

- Sea lamprey *Petromyzon marinus*;
- River lamprey *Lampetra fluviatilis*;
- Allis shad *Alosa alosa*;
- Twaite shad *Alosa fallax*; and
- European otter *Lutra lutra*.

6.1.2.12 The sea lamprey, river lamprey, allis shad and twaite shad are diadromous species. Diadromous species are either anadromous (adults of anadromous species migrate from coastal marine areas to freshwaters to spawn but most growth occurs at sea), or catadromous (adults migrate from freshwaters to marine waters to spawn, but most growth occurs within freshwaters). All four featured migratory fish species are anadromous.

6.1.2.13 Adult river lamprey generally enter UK rivers in late autumn with peaks in juvenile river lamprey abundance migrating downstream recorded between October and January (Claridge *et al.,* 1986). Sea lamprey migrate through MHW before entering the Daugleddau and Cleddau Rivers in early spring (Table 6.1). Sea lamprey are mainly restricted to the lower reaches of the river systems. Being poor swimmers, migrating lamprey generally move in shallow waters, along the edges of the main stream, particularly when the river current is strong (Kelly and King, 2001).

6.1.2.14 The upstream migration of allis and twaite shad to spawning areas occurs between March and June, reaching a peak in May. Spawning is dependent on temperature but usually occurs between May and July for twaite shad (Aprahamian *et al.*, 1998). The fish remain in fresh and/or estuarine waters during the summer, before migrating seaward in autumn (Table 6.1).

**Table 6.1: Summary of Migration Periods (upstream ↑ and downstream ↓) for SAC features.**

| Migratory fish | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | F | M | A | M | J | J | A | S | O | N | D |
| Allis and twaite shad | | | ↑ | ↑ | ↑ | ↑ | | | | | | |
| Allis and twaite shad (juv.) | | | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | | | |
| River lamprey | ↑ | | ↑ | ↑ | | | | ↑ | ↑ | ↑ | ↑ | |
| River lamprey (juv.) | ↓ | ↓ | ↓ | ↓ | ↓ | | | | | ↓ | ↓ | ↓ |
| Sea lamprey | | | | | ↑ | ↑ | ↑ | | | | | |
| Sea lamprey (juv.) | ↓ | | | | | | | | | ↓ | ↓ | ↓ |

6.1.2.15 The (Eurasian) otter is a semi-aquatic mammal which occurs in a wide range of ecological conditions, including inland freshwater and coastal areas. Populations in coastal areas use

shallow, inshore marine areas for feeding but also require freshwater for bathing and terrestrial areas for resting and breeding holts. Coastal otter habitat ranges from sheltered wooded inlets to more open, low-lying coasts. Inland populations utilise a range of running and standing freshwaters. These must have an abundant supply of food (normally associated with high water quality), together with suitable habitat, such as vegetated riverbanks, islands, reed beds and woodland, which are used for foraging, breeding and resting.

6.1.2.16 Otters are widespread on, and close to, the coastline throughout the SAC, both on the open coast and within the MHW, particularly within the Daugleddau and Cleddau Rivers. Spraint records and analysis and the distribution of suitable feeding locations indicate a wide feeding range. Otter distribution is mostly associated with the foreshore where there is good access to small rivers and stream valleys with scrub or tree cover. Feeding areas include rock-pools and sheltered boulder shores, while freshwater pools and streams are important for washing off salt. Sightings suggest that otters use both the sea and foreshore to move between the freshwater watercourses.

6.1.2.17 Spraint analysis and the distribution of suitable feeding locations (NRW, 2018) indicate that each otter has a wide feeding range and that most foreshore habitats in the SAC will be used by otter. Highest levels of use have been recorded in moderately sheltered waters close to the shore. Spraint analysis has found that European (freshwater) eels were the most important single component of the otter diet, with the spraints from MHW also having a wider variety of marine prey species found those analysed (NRW,2018).

6.1.2.18 Potential resting sites are widespread within the SAC but there are no known breeding holts. Resting places will typically be associated with the following features; dense vegetation cover including reedbeds and scrub, as well as in cavities amongst rocks and tree root systems. especially on the sides of the coastal freshwater streams flowing into the SAC.

6.1.2.19 Within the SAC, habitat of highest potential to support a breeding holt is associated with the Cleddau/Daugleddau Rivers but there are no known breeding holts. The SAC is considered to provide foraging grounds, access corridors and an area for social activity for the otter population (NRW, 2018).

6.1.2.20 Females with cubs have been very occasionally seen on the foreshore within the SAC. The otters within the SAC are part of the wider population living around freshwater habitats in Pembrokeshire and there will be frequent movement of individuals around the coast.

6.1.2.21 RSK undertook a preliminary ecological appraisal of the development site (RSK 2018 – Appendix 16.1 of the ES). An initial assessment of watercourses, areas of wetland, and adjacent habitat was made for their suitability for otter *Lutra lutra*. This included an assessment of water depth, water quality, vegetation and cover. The survey undertaken in 2018 comprised a detailed search for signs of otters including spraint (droppings), footprints, slides, paths, feeding evidence, holts (underground resting places) or couches (temporary resting places).

6.1.2.22 A biological data search contained records of otter potentially within 1 km of the site. The intertidal habitat provided by MHW, located at the northern part of the site, provides potential foraging and commuting habitat for otter and includes several docks and slipways.

6.1.2.23 The frontage of Pembroke Port comprises vertical walls constructed of concrete and stone together with a sloping wall of boulders. The boulders are adjacent to an area of amenity grassland, used by the general public while awaiting ferries. In places, wooden and metal docking areas are immediately adjacent to the frontage, and wooden and metal jetties extend into MHW. Several docks and slipways, extending inland from the Port frontage, and an area of boulders have the potential to be used by otters as temporary resting places and otter footprints were recorded in mud in a dock during a survey undertaken by RSK in 2015. No signs of otter activity were recorded during the 2018 survey, although it was not possible to undertake a survey of a portion of the Port frontage comprised of boulders.

#### Conservation Objectives

6.1.2.24 Conservation Objectives (COs) 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' of habitats and species features for which identified SACs are designated.

6.1.2.25 The COs for identified key habitat features of this SAC include:

- The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing;
- The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded; and
- The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded.

6.1.2.26 The COs for identified key species features of this SAC include:

- The population is maintaining itself on a long-term basis as a viable component of its natural habitat;
- 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; and
- 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.

### 6.1.3 West Wales Marine / Gorllewin Cymru Forol cSAC

#### Site Description

6.1.3.1 The site covers an area of 7,377 km$^2$, extending into the Irish Sea from the Llŷn Peninsula in north Wales to Pembrokeshire in west Wales. It extends almost to the mid-line (UK EEZ)

between the Republic of Ireland and Wales. The West Wales Marine candidate SAC (cSAC) is located approximately 11 km westwards of the site boundary and overlaps with a number of other SACs including parts of the Pembrokeshire Marine SAC. Along the westward boundary, water depths of up to 100 m are reached, though much of the site is 50 m or shallower. The cSAC contains a mixture of hard substrate and sediments, including rock, coarse sediment, sand and mud.

#### Qualifying Features

6.1.3.2 The cSAC has been identified as an area of importance for harbour porpoise *Phocoena phocoena*) It has been recognised as an area with a harbour porpoise population within the 90$^{th}$ percentile of the UK population.

6.1.3.3 The cSAC covers important summer habitat for harbour porpoise, while part of the cSAC in Cardigan Bay has also been identified as important habitat during the winter. It is estimated (based on the SCANS-II survey which took place in July 2005) that it supports approximately 2506 individuals for at least part of the year. This represents approximately 9% of the population within the UK part of the Celtic and Irish Sea Management Unit.

#### Conservation Objectives

6.1.3.4 To avoid deterioration of the habitats of the harbour porpoise or significant disturbance to the harbour porpoise, thus ensuring that the integrity of the cSAC is maintained and it makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for the UK harbour porpoise. To ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:

- The species is a viable component of the cSAC;
- There is no significant disturbance of the species; and
- The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

### 6.1.4 Cleddau Rivers/ Afonydd Cleddau SAC

#### Site Description

6.1.4.1 The River Cleddau is one of the westernmost rivers in Britain and can be broadly divided into its eastern and western arms. The catchment is dominated by agriculture with significant areas of permanent pasture woodland and semi natural vegetation. The eastern Cleddau River flows for 26 km while the western Cleddau River flows for 30 km.

6.1.4.2 Ecological structure and function of the SAC are dependent on hydromorphological processes, the quality of riparian habitats and connectivity of habitats.

#### Qualifying Features

6.1.4.3 Key features of the SAC have been scoped out from further assessment (see Section 2).

6.1.4.4 Otter is present throughout the Cleddau Rivers SAC located upstream of Haverfordwest and directly linked to the Pembrokeshire Marine SAC. Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.

6.1.4.5 The otter population in the Cleddau River catchment and in Pembrokeshire Marine is expected to be dynamic with otters dispersing widely and some movements of individuals between the two SACs.

6.1.4.6 River lamprey and sea lamprey are considered important features but are not the main focus of management and monitoring.

6.1.4.7 As discussed above (paragraph 6.1.2.12), river lamprey and sea lamprey are diadromous species, migrating from coastal marine areas to freshwaters to spawn but most growth occurs at sea (i.e. anadromous).

6.1.4.8 Adult river lamprey generally enter UK rivers in late autumn and peaks in the abundance of juvenile river lamprey migrating downstream have been recorded between October and January (Claridge *et al.,* 1986). Sea lamprey migrate upstream and enter rivers such as the River Cleddau in early spring (Table 6.1). Sea lamprey are mainly restricted to the lower reaches of the River Cleddau catchment. Being poor swimmers, migrating lamprey generally move in shallow waters, along the edges of the main stream, particularly when the river current is strong (Kelly and King, 2001). Local knowledge indicates migrating sea lamprey and river lamprey are not able to migrate past Town weir.

### Conservation Objectives

6.1.4.9 The COs for the sea lamprey is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The conservation objectives for the watercourse as defined in the citation[1].
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range[2] of the feature in the SAC is neither being reduced nor is likely to be reduced 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.

[1] As the project will not impact on the watercourse itself this conservation objective has not been considered further

2 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.

The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

6.1.4.10 The COs for the river lamprey is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The conservation objectives for the watercourse as defined above is met.
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range[2] of the feature in the SAC is neither being reduced nor is likely to be reduced 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.

### 6.1.5 Pembrokeshire Bat Sites and Bosherton Lakes SAC

#### Site Description

6.1.5.1 Bosherston Lakes are an outstanding shallow marl lake system created at intervals in the late 18th and mid-19th centuries by damming a limestone river valley. They are fed in part by a series of calcium-rich springs and are isolated from the sea by a small sand dune ridge. Charophytes are represented by bristly stonewort *Chara hispida* which forms dense beds up to 1 m high, with individual plants up to 3.5 m long, and by variable quantities of *C. globularis*, *C. virgata* and *C. vulgaris*. Extensive white-water lily *Nymphaea alba* beds also occur, mainly in the western and central arms. In contrast, the eastern arm is characterised by variably dense stands of curled pondweed *Potamogeton crispus*, fennel pondweed *Potamogeton pectinatus*, spiked water-milfoil *Myriophyllum spicatum* and Canadian waterweed *Elodea canadensis*. Emergent vegetation fringes parts of the system, mostly common reed *Phragmites australis*, bulrush *Typha latifolia*, common spike-rush *Eleocharis palustris* and branched bur-reed *Sparganium erectum.*

#### Qualifying Features

6.1.5.2 Greater horseshoe bat *Rhinolophus ferrumequinum* is an Annex II species that is a primary reason for selection of this site as a SAC. The SAC supports approximately 9.5% of the UK population located on the north-western extremity of its range. The SAC contains a mixture of maternity, transitory and hibernation sites and so demonstrates good conservation of features required for survival.

6.1.5.3 Annex II species present as a qualifying feature, but not a primary reason for site selection are lesser horseshoe bat *Rhinolophus hipposideros* and otter *Lutra lutra*

6.1.5.4 The Bat Species Action Plan (2006) states that Pembrokeshire greater horseshoe bat population has staged a recovery and is now at record levels in terms of number of breeding females attending the maternity roosts and the number of babies born. The recovery has been helped by the mild winters that have characterised much of the past decade as well as by factors such as improved protection and awareness of their conservation requirements.

6.1.5.5 Surveys undertaken in 2018 (RSK 2018 – Appendices 16.3 and 16.4 of the ES) found no evidence of greater horseshoe bats roosting in potential roosting areas, namely building B17 (Commodore Hotel) or the adjoining B10 located to the south-east of the proposed application site. However, greater horseshoe bats are present in the locality. The low number of passes were recorded on static remote recording detectors and there were a few incidental records of commuting greater horseshoe bats during emergence surveys. The low levels of activity indicates that the site is likely to be used by a small number of greater horseshoe bats, which will be roosting in the wider area.

6.1.5.6 During 30 days recording completed over seven months 21 greater horseshoe bat passes were detected in the woodland in the south-eastern corner of the site with 11 passes over four days in August and seven in May with no activity recorded on static during four of the surveyed months. In comparison, over the 30 days recording undertaken over seven months there were only nine passes in the off-site avenue of trees (to the east of the buildings B10 and B17).

6.1.5.7 The levels of activity are low and variable with confirmed occasional use of the woodland block within the site during the summer months.

### Conservation Objectives

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

- The greater horseshoe bat population will be capable of maintaining itself on a long-term basis as a viable component of its natural habitats.
- The natural range of greater horseshoe bats will neither be reduced nor will be likely to be reduced for the foreseeable future, and
- There will be sufficient habitat to maintain its populations on a long-term basis.
- At least three SSSI maternity roosts will be occupied annually by adult greater horseshoe bats and their babies (Stackpole Courtyard Flats and Walled Garden SSSI, Slebech Stable Yard Loft, Cellars and Tunnels SSSI and Felin Llwyngwair SSSI).
- Carew Castle SSSI will continue to be used as an intermediate greater horseshoe bat roost, during the spring and autumn, as a male summer roost and an autumn/spring mating roost.
- The greater horseshoe bat population at the component SSSI's will be stable or increasing.

- There will be a sufficiently large area of suitable habitat surrounding these roosts to support the bat population, including continuous networks of sheltered, broadleaved woodland, tree lines and
- hedgerows connecting the various types of roosts with areas of insect-rich grassland and open water.
- All factors affecting the achievement of these conditions are under control.

## 6.2 Screening for Likely Significant Effects (LSEs)

6.2.1.1 The proposed development is clearly a plan or project. Furthermore, it is a project not directly connected with, or necessary to, the management of any European site. The CA is therefore required to determine whether the project is likely to have a significant effect on the features of relevant European sites ensuring that conservation objectives for each site are achieved.

6.2.1.2 Evidence to assist the CA in reaching a conclusion on this question is detailed within the description below and the matrices that follow. This evidence itself draws upon information and data provided in Chapter 6 and 16 of the ES (MHPA, 2019).

6.2.1.3 The matrices that are provided set out the author's professional view on whether a significant effect is considered likely. These have been provided for information and with the aim of assisting the CA in reaching a conclusion with respect to LSEs. The matrices are 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 (NSIPs). Although the proposal is not an NSIP, the matrix approach used is considered to be relevant to defining the extent of impacts from the proposed development on identified designated sites features and whether the conservation objectives of each site can still be achieved if the proposal were to go ahead.

6.2.1.4 Matrix Key:

✓ - LSE cannot be excluded

× – LSE can be excluded

C = construction

O = operation

6.2.1.5 Where effects are not applicable i.e. no impact pathway to a particular feature they are greyed out.

## 6.3 Pembrokeshire Marine/ Sir Benfro Forol SAC

Table 6.2 provides a summary of the screening process undertaken to assess whether the likely effects of the proposed development are going to be significant on identified SAC features. The text subsequent to this table provides a brief assessment to support the screening in or out of each of these LSE on the identified SAC features.

**Table 6.2: Likely significant effects matrix for the Pembrokeshire Marine SAC.**

| European site features | Name of European site: *Pembrokeshire Marine SAC* | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Distance to the Project: *Directly adjacent to the Pembroke Dock jurisdiction northern boundary limits* | | | | | | | | | | | | | | | |
| | Likely Significant Effects of the Project: | | | | | | | | | | | | | | | |
| | *Noise and vibration* | | *Increased vessel movements (Collision risk)* | | *Increased human presence* | | *Construction footprint* | | *Artificial Lighting* | | *Accidental Pollution events* | | *Liquid discharges* | | *In -combination effects* | |
| | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* |
| *Benthic Habitats* | | | | | | | X I | | | | ✓ P | X Q | ✓ S | | ✓ W | X X |
| *Migratory Fish (sea lamprey river lamprey, allis shad, twaite Shad)* | ✓ A | X B | | | | | X J | | X L | X M | ✓ P | X Q | ✓ T | | ✓ W | X X |
| *European otter* | ✓ C | X B | X E | X F | ✓ G | XH | X K | | ✓ N | ✓ O | ✓ P | X Q | X U | | ✓ W | X X |
| *Marine mammals (Grey seal)* | ✓ D | | X E | X F | | | | | | | X R | X Q | X V | | ✓ W | X X |

**A: Noise emissions during construction phase on migratory fish species:** Underwater noise emissions produced during the construction phase from dredging activities including rock breaking of the existing slipway have the potential to cause either chronic or acute effects to migrating fish species. Therefore, there is the potential for LSE to migratory fish.

**B: Noise emissions during operation phase:** Single source of underwater noise identified during operation will not cause an increase in underwater noise levels as vessel traffic will remain similar to baseline levels. No LSE is therefore anticipated, and this aspect ***is screened out*** of any further assessment.

**C: Noise emissions during construction phase on otter:** Airborne or underwater noise emissions from construction activities including dredging and building construction activities onshore have the potential to impact on the movement and behaviour of otters within the vicinity of the site, causing potential displacement and barrier effects, which would have the potential to result in LSE to this SAC feature.

**D: Noise emissions during construction phase on grey seal:** Noise emissions produced during the construction phase from dredging activities including rock breaking of the existing slipway have the potential to cause either chronic or acute effects to grey seal. Therefore, there is the potential for LSE to grey seal.

**E: Increased vessel movements during construction:** The proposed marine works will be undertaken primarily within the intertidal zone using plant onshore or from a barge moored within the Port. The barge is likely to remain stationary for long periods with only limited and slow movement to and from the site. The number of vessel movements during construction is likely to be very small in relation to the existing levels of vessel activity within the dock. The proposal will not cause LSE and this aspect has therefore been ***screened out*** from further assessment.

**F: Increased vessel movements during operation:** The number of vessel movements predicted during operation phase is not likely to increase above baseline levels. Therefore, there is no LSE and this aspect has been ***screened out*** from further assessment**.**

**G: Increase in human presence during construction on otter:** An increase in human presence above baseline levels is predicted during construction activities. Otter that are present could therefore be disturbed as a consequence of increased human activity with the potential to result in a LSE to this SAC feature.

**H: Increase in human presence during operation on otter:** The level of human activity predicted during the operation phase is not likely to increase above baseline levels. Therefore, there is no LSE on this feature, and it has been ***screened out*** from further assessment**.**

**I: Construction footprint on benthic habitats:** The land take, dredging and construction works for the project and provision of vessel access within Pembroke Port would have no direct impact on benthic habitats identified as features of Pembrokeshire Marine SAC, as all activities will be undertaken outside the boundaries of Pembrokeshire Marine SAC. No LSE is anticipated for this SAC feature and this aspect is therefore ***screened out*** of any further assessment.

**J: Construction footprint on migratory fish species:** The land take, dredging and construction works for the project and provision of vessel access within Pembroke Port would have no direct impact on habitats associated with migratory fish features of Pembrokeshire Marine SAC. All activities will remove low sensitive habitats associated with an already highly modified environment outside the boundaries of the SAC. No LSE is anticipated for this SAC feature and this aspect is therefore ***screened out*** of any further assessment.

**K: Construction footprint on otter:** The land take, dredging and construction works for the project and provision of vessel access within Pembroke Port would have no direct impact on habitats associated with otter population associated with Pembrokeshire Marine SAC, as all activities will be undertaken within a highly modified environment outside the boundaries of Pembrokeshire Marine SAC. No LSE is anticipated for this SAC feature and this aspect is therefore ***screened out*** of any further assessment.

**L: Artificial lighting during construction on migratory fish species:** Marine work activities will likely be restricted to day time hours, however should night-time activities be required lighting associated with works from the barge will be installed. Given that the amount of lighting required will be small and will not increase significantly above baseline conditions there is not expected to be LSE on this feature. This aspect has therefore been ***screened out*** from further assessment.

**M: Artificial lighting during operation phase on migratory fish species:** There will be no increase in artificial lighting emissions during operation compared with baseline levels. All operational lighting will be used specifically for safety purposes during night time activities within the confines of the Port boundary reducing potential for light spill outside the Port limits. It is assumed there will be no light spill from the project above baseline levels that could affect migratory fish species populations of the Pembrokeshire Marine SAC. No LSE is anticipated for this SAC feature and this aspect is therefore ***screened out*** of any further assessment.

**N: Artificial lighting during construction on otter:** Artificial lighting from onshore construction activities around the new slipways and on the dock frontage during night time hours may cause an increase in light spill onto the slipways and adjoining intertidal habitat that could affect otter movement and behaviour Therefore, there is the potential for LSE to otter populations from artificial lighting within the Pembrokeshire Marine SAC.

**O: Artificial lighting during operation phase on otter**: There is a potential increase in artificial lighting around the new slipways and on the frontage to the dock during operation compared to current baseline levels. Operational lighting will be used specifically for safety purposes during night time activities within the confines of the Port boundary but there is potential for an increase in light spill onto the slipways and adjoining intertidal habitat that could affect otter behaviour. Artificial lighting has the potential to effect otter movement and behaviour during night time hours. Therefore, there is the potential for LSE to otter populations from artificial lighting within the SAC.

**P: Accidental release of pollutants during construction:** There is the potential for the accidental release of pollutants into the marine environment that could cause toxic effects to the epifauna and infauna associated with benthic habitats, migratory fish and otter populations during construction works. Pollution may include diesel oil, leachates from cements and/or grouts used in construction. Therefore,

there is the potential for LSE to benthic habitats, migratory fish and otter populations from accidental spill events during construction.

**Q: Accidental release of pollutants during operation:** The potential risk associated with accidental spill events from Port activities during operation will remain identical to the level of risk which are currently regulated by the Health and Safety Executive (HSE) and the Environment Agency under the Health and Safety at Work Act 1974. The requirement to risk assess is carried out by MHPA under their stated compliance with the Port Marine Safety Code. In terms of emergency or crisis management, MHPA has effective spill response procedure in place to handle potential emergency scenarios. Due to these existing measures the likelihood of an accidental pollution event is negligible and there is no LSE on the benthic habitats, migratory fish, otter or grey seal from pollution events. This aspect is therefore ***screened out*** of any further assessment.

**R: Accidental release of pollutants during construction phase on grey seal:** The potential for exposure of accidental release of pollutants to this feature is extremely small. Any accidental release will be localised due to the low volumes of chemicals and pollutants that will be used, and the presence of grey seal adjacent to the site is known to be low due to the low number of individuals recorded within this area of MHW. Therefore, there is no LSE and this aspect has been **screened out** from further assessment.

**S: Liquid discharges during construction phase on benthic habitats:** Liquid discharges predicted to be released during construction activities would be predominantly from suspension of sediments from dredging of the slipway and within the Graving Dock. Dredging activities can result in sediment plumes that migrate from the point of disturbance. As mobilised particles fall out of suspension a layer of dredge sediments can form on the seabed outside the dredge footprint. Deposited sediments can restrict feeding mechanisms of benthic fauna and cause light restrictions to macroalgae and seagrass. Dredging activities can also cause release of sediment bound contaminants into the water column resulting in toxic effects to benthic organisms. Therefore, there is the potential for LSE to benthic habitats from liquid discharges during construction.

**T: Liquid discharges during construction phase on migratory fish:** Liquid discharges predicted to be released during construction activities would be predominantly from suspension of sediments from dredging. Dredging activities can cause release of sediment bound contaminants into the water column. Suspended sediments can also result in sediment plumes that can act as physical barrier to migrating fish species. Therefore, there is the potential for LSE to migratory fish from liquid discharges during construction.

**U: Liquid discharges during construction phase on otter:** Liquid discharges predicted to be released during construction activities would be predominantly from suspension of sediments from dredging. Dredging activities can cause release of sediment bound contaminants into the water column which can cause toxicity to effects to prey species. Therefore, there is the potential for LSE to otter from liquid discharges during construction.

**V: Liquid discharges during construction phase on grey seal:** Generation of sediment plumes from dredging will not impact on grey seal as grey seal are able to forage in highly turbid conditions typical of

those caused by dredging. Any release of sediment bound contaminants will be of low concentrations and are not considered bioavailable to grey seal. The proposal will not cause LSE on this feature and it has therefore been ***screened out*** from further assessment.

**W: In combination effects during construction phase:** Construction activities associated with planned projects adjacent to the site and operation activities associated with land uses within the MHW have the potential to cause LSE to benthic habitats, migratory fish, otter and grey seal from in-combination effects during construction of the project.

**X: In-combination effects during operation phase:** The project operational activities will remain identical to baseline conditions. It is therefore considered that in-combination effects associated with other planned projects will not result in LSE to benthic habitats, migratory fish, otter and grey seal. This aspect is therefore ***screened out*** of any further assessment.

## 6.4 West Wales Marine / Gorllewin Cymru Forol cSAC

6.4.1.1 The LSE identified for features of this SAC, namely marine mammals (harbour porpoise) are identical for those described for the marine mammal receptors for Pembrokeshire Marine SAC (Table 6.2). The text provided with Table 6.2 details a brief assessment to support the screening in or out of each of these LSE on the identified marine mammal features of this SAC.

6.4.1.2 Table 6.3 provides a summary of the screening process undertaken to assess whether the likely effects of the proposed development are going to be significant on identified SAC features.

**Table 6.3: Likely significant effects matrix for the West Wales Marine / Gorllewin Cymru Forol cSAC.**

| European site features | Name of European site: 8.2*West Wales Marine / Gorllewin Cymru Forol cSAC* | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Distance to the Project: 11 km to the eastern boundary of the cSAc | | | | | | | | | | | | | | | |
| | Likely Significant Effects of the Project | | | | | | | | | | | | | | | |
| | *Noise and vibration* | | *Increased vessel movements (Collision risk)* | | *Increased human presence* | | *Construction footprint* | | *Artificial Lighting* | | *Accidental Pollution events* | | *Liquid discharges* | | *In -combination effects* | |
| | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* |
| *Marine Mammals (Harbour Porpoise)* | ✓ D | | X E | X F | | | | | | | X R | X Q | X V | | ✓ W | X X |

## 6.5 Cleddau Rivers/ Afonydd Cleddau SAC

6.5.1.1 Table 6.4 provides a summary of the screening process undertaken to assess whether the likely effects of the proposed development are going to be significant on identified SAC features. The LSE identified for features of this SAC, namely migratory fish, are identical for those described for the Pembrokeshire Marine SAC (Table 6.2) due to the likely connectively. The text provided with Table 6.2 details a brief assessment to support the screening in or out of each of these LSE on the identified features of this SAC.

6.5.1.2 The designated site feature, otter population, in the Cleddau Rivers catchment and in Pembrokeshire Marine SAC is expected to be dynamic with otters dispersing widely and frequent movements and exchanges between the two SACs.

**Table 6.4: Likely significant effects matrix for the Cleddau Rivers/ Afonydd Cleddau SAC.**

| European site features | Name of European site: Cleddau Rivers/ Afonydd Cleddau SAC | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Distance to the Project: 11 km | | | | | | | | | | | | | | | |
| | Likely Significant Effects of the Project | | | | | | | | | | | | | | | |
| | *Noise and vibration* | | *Increased vessel movements (Collision risk)* | | *Increased human presence* | | *Construction footprint* | | *Artificial Lighting* | | *Accidental Pollution events* | | *Liquid discharges* | | *In -combination effects* | |
| | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* | *C* | *O* |
| *Migratory Fish: river lamprey and sea lamprey* | ✓ A | X B | | | | | X J | | X L | X M | ✓ P | X Q | ✓ T | | ✓ W | X X |
| *Otter* | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH | X AH |

AH**: Impacts from the project on otter**: Although there will be some movement of individual otters between the Cleddau Rivers SAC and the Pembrokeshire Marine SAC, the ranges of otters in the Cleddau Rivers catchment will be centred over 11km to the north of the proposed development. Individuals are typically far ranging but movement between Haverfordwest and the area of MHW adjoining the site will be very infrequent. Consequently, potential localised effects associated with construction and operation will not have any adverse effect on individual otter or the population. This feature is therefore ***screened out*** of any further assessment

## 6.6 Pembrokeshire Bat Sites and Bosherton SAC

6.6.1.1 The screening process has been undertaken to assess whether the likely effects of the proposed development have the potential to be significant on identified SAC features. Greater horseshoe bats are a primary qualifying feature of the SAC and a primary reason for selection. The lesser horseshoe bat *Rhinolophus hipposideros* is also a qualifying feature, but not a primary reason for selection.

6.6.1.2 The text below supports the screening of potential effects on the greater horseshoe bat population.

6.6.1.3 The proposed development will result in the loss of grassland, ruderal and scrub vegetation in the south of the site due to the construction of a site storage area and proposed light assembly and maintenance building.

6.6.1.4 The site makes a very minor contribution to the potential foraging habitat available to the Pembrokeshire greater horseshoe bat population. A foraging area likely to be used by a small number of individuals will be lost. Although the available foraging habitat will reduce, the area being lost will only be a very small part of the total territory being used by greater horseshoe bats roosting in the local area, as indicated by the small number of detections, the absence of any detected activity during four of the seven surveyed months and the absence of greater horseshoe passes during each of the transect surveys. No lesser horseshoe bat activity was recorded within the site during walked transects or on static detectors recording each month.

6.6.1.5 The site is not located in an area that would be of value to known high status greater horseshoe or lesser horseshoe roosts. The development will not result in the fragmentation of flight lines or create a barrier to movement to bats moving between roosts and foraging habitats.

6.6.1.6 In this context, the changes resulting from development on the southern boundary (even in the absence of mitigation), will not have the potential to significantly affect the conservation status of the greater horseshoe or lesser horseshoe bat populations with no impacts on the ability of the population to maintain itself in the short or long-term basis. This feature is therefore ***screened out*** of any further assessment.

# 7 STAGE 2: APPROPRIATE ASSESSMENT

7.1.1.1 It has been identified that there is the potential for LSE on identified features within the Pembrokeshire Marine SAC, West Wales Marine SAC and Cleddau Rivers SAC, during the construction and operational phases of the proposed development as follows:

- Underwater noise emissions during construction on migratory fish species, grey seal and harbour porpoise;
- Airborne noise emissions during construction on otter;
- Increased human presence during construction on otter;
- Artificial lighting during construction on otter;
- Accidental pollution events during construction on benthic habitats, migratory fish species and otter;
- Liquid discharges during construction on benthic habitats and migratory fish; and
- In-combination effects during construction on benthic habitats, migratory fish species, grey seal, otter and harbour porpoise.

7.1.1.2 All other remaining potential effects on features of identified designated sites have been screened out and have therefore not been taken forward for Appropriate Assessment.

## 7.2 Underwater Noise Emissions during Construction

7.2.1.1 Construction activities including sheet piling, dredging and vessel movements have the potential to generate underwater noise.

7.2.1.2 Noise modelling for the proposed piling works, dredging and vessel movements has been undertaken to determine the magnitude of the impact for identified qualifying features. The modelling undertaken has been based on an established, peer reviewed, range dependent sound propagation model, which utilises the semi-empirical model developed by Rogers (1981); see Appendix 6.2 of the ES.

7.2.1.3 The acoustic source terms adopted for the modelling for the piling activity were:

- Sound Exposure Levels (SELs) per pulse of 192 dB re 1 $\mu Pa^2s$ @ 1 m for both impact and vibration piling methods.
- Zero to peak sound pressure levels (SPLs) of 210 and 198 dB re 1 µPa @ 1 m for impact and vibration piling methods respectively (assuming exposure over a 12-hour period and rms(T90) source levels of 202 and 192 dB re 1 µPa @ 1 m for impact and vibration piling methods respectively.

7.2.1.4 Radiated vessel source sound pressure levels relates to factors including vessel size, speed, load, condition, age, and engine type and can range from <150 dB re 1µPa to over 190 dB re 1µPa (McKenna *et al.* 2012). Subsea noise from barges will most likely fall within a low frequency spectrum.

7.2.1.5 The source level for dredging was determined to be 163 dB re 1 µPa @ 1 m (rms). The range of source levels was determined to be between 163 and 172 dB re 1 µPa @ 1 m over a range of operational conditions.

### 7.2.2 Embedded Mitigation

7.2.2.1 A soft start procedure will be implemented prior to commence of piling activity to allow receptor species to avoid areas of increased noise levels from piling activities, thereby eliminating the risk of injury to these species.

7.2.2.2 Piling activities undertaken in daylight hours only to provide suitable windows of opportunity for migratory fish species to pass Pembroke Port undisturbed on their migratory routes.

### 7.2.3 Migratory Fish associated with Pembrokeshire Marine SAC and Cleddau Rivers SAC

7.2.3.1 Sound plays an important role for fish; allowing them to communicate with one another, detect predators and prey, navigate their environment and avoid hazards.

7.2.3.2 Recent peer reviewed guidelines have been published by the Acoustical Society of America (ASA) and provide directions and recommendations for setting criteria (including injury and behavioural criteria) for fish. For the purposes of this assessment, the Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.,* 2014) was considered to be most relevant for impacts of underwater noise on fish species. The Popper *et al.* (2014) guidelines broadly group fish into the following categories according to the presence or absence of a swim bladder and on the potential for that swim bladder to improve the hearing sensitivity and range of hearing (Popper *et al.*, 2014):

- Group 1: Fishes lacking swim bladders (e.g. elasmobranchs and flatfish). These species are only sensitive to particle motion, not sound pressure;
- Group 2: Fishes with a swim bladder that does not play a role in hearing (e.g. salmonids). These species are only sensitive to particle motion;
- Group 3: Fishes with swim bladders that are close, but not connected, to the ear (e.g. gadoids and eels). These fishes are sensitive to both particle motion and sound pressure and show a more extended frequency range than groups 1 and 2, extending to about 500 Hz; and
- Group 4: Fishes that have special structures mechanically linking the swim bladder to the ear (e.g. clupeids such as herring, sprat and shads). These fishes are sensitive primarily to sound pressure, although they also detect particle motion. These species have a wider frequency range, extending to several kHz and generally show higher sensitivity to sound pressure than fishes in Groups 1, 2 and 3.

#### Fish – Injury

7.2.3.3 For fish, the most relevant criteria for injury are considered to be those contained in the recent Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.,* 2014). The criteria used

in this noise assessment for impulsive piling are provided in Chapter 6, Table 20 of the ES. In the table, both peak and SEL criteria are unweighted summarises the fish injury criteria recommended for continuous noise based on the recent Popper *et al.*, 2014 guidelines. The criteria used in this noise assessment for non-impulsive noise sources are provided in Chapter 6, Table 21 of the ES are also based on the recent Popper *et al.*, 2014 guidelines.

7.2.3.4 Based on modelling undertaken using the threshold criteria adopted, no injury to all fish groups is predicted from impulsive noise source such as impact piling. Some recoverable injury may occur for Group 3 fish if dredging operation continues for 48 hours and fish remained within a few metes for the source for this period (i.e. highly unlikely given the high motility of fish who will move away from the noise source). All other fish groups are considered to be at low risk during non-impulsive noise such as vessel movements and dredging activities.

### Fish - Behaviour

7.2.3.5 Behavioural effects in response to construction related underwater noise include a wide variety of responses including startle responses (also known as C-turn responses), strong avoidance behaviour, changes in swimming or schooling behaviour or changes of position in the water column. The Popper *et al.* (2014) guidelines provide qualitative behavioural criteria for fish from a range of noise sources. These categorise the risks of effects in relative terms as “high”, “moderate” or “low” at three distances from the source: “near” (i.e. tens of metres), “intermediate” (i.e. hundreds of metres) or “far” (i.e. thousands of metres). These behavioural criteria for continuous noise such as vessel movements and dredging are summarised in Table 22 of the ES.

7.2.3.6 It is important to note that the Popper *et al.* (2014) criteria for disturbance to fish due to sound are qualitative rather than quantitative. Consequently, a source of noise of a particular type (e.g. piling) would result in the same predicted impact, no matter the level of noise produced or the propagation characteristics.

7.2.3.7 Therefore, the criteria presented in the Washington State Department of Transport Biological Assessment Preparation for Transport Projects Advanced Training Manual (WSDOT, 2011) of un-weighted sound pressure level of 150 dB re 1 µPa (rms) is also used in this assessment for predicting the extent of behavioural effects due to impulsive piling.

7.2.3.8 Based on the modelling undertaken and threshold criteria presented behavioural effects from impact piling could be observed within 850 m of the source. For non-impulsive noise sources behavioural response is predicted within 19 m for vessel movements and 5 m for dredging. No quantitative disturbance criteria has been identified for vibro-piling for disturbance therefore the Popper *et al.* (2014) guideline criteria should be adopted.

7.2.3.9 The migratory fish species/life stages with the greatest sensitivity to underwater noise are adult twaite shad and adult allis shad (both species are fish in which the swim bladder is involved in hearing) during their upstream migrations in April to June.

7.2.3.10 On the basis of the Popper *et al.* (2014) guidelines, using the magnitude of the noise likely to be generated as a result of piling, the risk to all fish, including migratory fish, from mortality and

potential mortal injury as a result of the continuous sound produced by the piling, even in close proximity to the source (i.e. tens of metres) has not been identified for the (comparatively low) noise levels predicted for the proposed development.

7.2.3.11 Potential behavioural effects including barrier effects are possible given the narrow morphology of the MHW and may cause restrictions to the movement of migratory species. Underwater noise modelling (Appendix 6.2 of the ES) has predicted disturbance effects up to a distance of 850 m from the source during impact piling. Therefore, if piling is undertaken during the species migration periods some disturbance may occur across the width of the MHW. While disturbance effects could include restriction to migration, sound levels will be highly unlikely to be at a level that will result in a barrier to fish migrating within the MHW. At some point across the width of the MHW sound levels will be sufficient level for migratory fish species to pass. In addition, the short-term duration and intermittent nature of the impact piling will ensure sufficient periods of time during the activity in which there will be no noise. It should also be noted that impact piling (on which modelling outputs were based) will only be undertaken to complete each pile, with the majority of piling being undertaken using vibro-piling. According to the Popper *et al.* (2016) guidelines, there is a moderate risk of disturbance effect within hundreds of metres from the source for vibro-piling and therefore is unlikely to restrict the passage of migrating species within the MHW.

7.2.3.12 Sea lamprey have been reported to respond to low frequencies (20-100 Hz) (Lenhardt and Sismour, 1995), though it has been suggested that sound may not be relevant to these species at all (Popper, 2005). Therefore, although uncertain, the sensitivity of sea lamprey to underwater noise and vibration is likely to be less than that for shad and Atlantic salmon.

7.2.3.13 In summary, it is highly unlikely that the piling will result in auditory injury. Some habituation to noise may also be anticipated for the fish assemblage in the area. However, this may not be true of migratory species, due to their infrequent occurrence within the vicinity of Pembroke Port (i.e. only during migration periods). Sound levels generated by the piling, albeit intermittent, will result in the greater noise emissions over the short term compared to those associated with vessel traffic, which will result in lower sound pressure levels, although will represent more continuous sound sources.

### 7.2.4 Effects of Underwater Noise Emissions during Construction on COs of Migratory Fish Species of the Pembrokeshire Marine SAC

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.2.4.1 The project will not affect the ability of migratory fish species populations to be maintained in the long term given the short term, intermittent and temporary nature of construction activities (including piling) and will not restrict migration behaviour through the MHW. Therefore, this objective will not be restricted from being achieved.

*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*.

7.2.4.2 Some restriction to the natural range will be imposed by the project from underwater noise emissions to a localised area, predominantly within the existing Port jurisdiction, during construction activities. However, the area in which disturbance to migratory fish species may occur is highly limited spatially, will return to background conditions following completion of impact piling and dredging activities (i.e. activities occurring intermittently over a period of approximately three weeks for each activity) and therefore this objective will not be restricted from being achieved.

*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.*

7.2.4.3 The objective to maintain the habitats that migratory species rely on will not be affected by underwater noise emissions from the project and therefore this objective will not be restricted from being achieved.

### 7.2.5 Effects of Underwater Noise Emissions during Construction on COs of Migratory Fish Species of the Cleddau Rivers SAC

*The population of the feature in the SAC must be stable or increasing over the long term.*

7.2.5.1 The project will not affect or restrict the objective for migratory fish populations to remain stable or to increase over the long term as construction activities (including piling) are short term, intermittent and temporary in nature and will not restrict migration behaviour to the Cleddau Rivers. This objective will therefore not be restricted from being achieved.

*The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.*

7.2.5.2 A limited restriction to the natural range will be imposed by the project from underwater noise emissions to a localised area, predominantly within the existing Port jurisdiction, during construction activities. However, the area in which temporary disturbance to migratory fish species may occur will return to background conditions following completion of impact piling and dredging activities (i.e. activities occurring intermittently over a period of approximately 3 weeks). This objective will therefore not be restricted from being achieved.

*Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.*

7.2.5.3 The project is not located within the SAC so therefore migratory fish species will not be hindered by artificial barriers. Underwater noise associated with the proposed development will also not hinder passage through the MHW.

*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.*

7.2.5.4 The project will not affect channel morphology within this SAC and therefore the project will not affect this objective from being achieved.

## 7.2.6 Grey Seal associated with Pembrokeshire Marine SAC

### Injury

7.2.6.1 The injury threshold criteria adopted for the impulsive noise sources were based on those proposed in NOAA (NMFS, 2018) and are presented in Table 7.1. Based on the modelling undertaken, the resultant Permanent Threshold Shift (PTS) injury ranges for the proposed impact piling activities on grey seal show that for both Sound Exposure Levels (SEL) (cumulative) and peak levels injury is not predicted.

**Table 7.1: Summary of injury ranges for marine mammals due to impact piling (N/E = threshold not exceeded) in accordance with adopted SEL and Peak thresholds.**

| Species / Group | Threshold (Weighted $SEL_{cum}$) | Range | Threshold (Peak SPL) | Range |
|---|---|---|---|---|
| Phocid pinniped (PW) | 185 dB re 1 $\mu Pa^2s$ | *N/E* | 218 dB re 1 µPa (pk) | *N/E* |

7.2.6.2 The injury threshold criteria adopted for the non-impulsive noise sources such as vibro-piling, dredging and vessel movements was 201 dB re 1 $\mu Pa^2s$ based on those proposed in NOAA (NMFS, 2018).

7.2.6.3 Based on the modelling undertaken, the resultant PTS injury ranges for the non-impulsive noise sources such as dredging and vessels movements, show that injury is predicted at a distance up to 4 m for pinnipeds (grey seal).

7.2.6.4 It should be noted that the SEL injury ranges are based on a marine mammal being within that range of the vessel or dredging activity continuously over a 24-hour period. Consequently, it is considered that these ranges are over estimates and over precautionary. Injury from vibro-piling activities which is also considered to be a non-impulsive noise source is also not predicted to occur based on modelling undertaken.

### Behaviour

7.2.6.5 Beyond the area in which injury may occur, the effect on grey seal behaviour is the most important measure of impact. Significant (i.e. non-trivial) disturbance may occur when there is a risk of animals incurring sustained or chronic disruption of behaviour or when animals are displaced from an area, with subsequent redistribution being significantly different from that occurring due to natural variation.

7.2.6.6 For impulsive sound sources, the assessment adopted a conservative approach and uses a precautionary level of 140 dB re 1 µPa (rms) which has been used to indicate the onset of low-level marine mammal disturbance effects for all mammal groups and the US National Marine Fisheries Service (NMFS 2005) Level B harassment threshold of 160 dB re 1 µPa (rms). For vibro-piling, the threshold criteria adopted was based on (NMFS, 2005) guidance which sets

the marine mammal level B harassment threshold for continuous noise at 120 dB re 1 µPa (rms).

7.2.6.7 From underwater noise modelling undertaken (Appendix 6.2 of the ES) the maximum disturbance range for marine mammals for impact piling activities causing mild disturbance is predicted as 2.8 km and for strong disturbance it is 251 m.

7.2.6.8 For vibro-piling, disturbance could occur within 4 km of the source based on the 120 dB re 1µ Pa (rms) threshold. However, it should be noted that operational noise levels will not be dissimilar to those already experienced in the area which is already heavily trafficked. Consequently, this is likely to be an over estimate of disturbance range for vibro-piling activities.

7.2.6.9 For dredging and vessel movements non-impulsive sound threshold criteria was adopted. Disturbance to grey seal could occur within 1.6 km, although as noted for vibro-piling, operational noise levels will not be dissimilar to those already experienced in the area which is already heavily trafficked. Consequently, this is likely to be an over estimate of disturbance range for vessels and dredging.

### 7.2.7 Effects of Underwater Noise Emissions during construction on COs of Grey Seal of the Pembrokeshire Marine SAC

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat*

7.2.7.1 Low levels of short-term disturbance to individuals (masking and avoidance) of the population within the vicinity of the site are predicted during marine works construction activities for a period of approximately three weeks (noting any noise emissions will occur intermittently throughout this period). Occurrences of grey seal within this part of the MHW are also rare, with only low abundances of this species recorded in the vicinity of Pembroke Port (see paragraph 6.1.2.10). Noise emissions during construction will therefore not restrict the objective of the population being able to maintain itself as a viable component of its natural habitat over the long-term.

*There is no significant disturbance of the species.*

7.2.7.2 Low levels of masking and avoidance behaviour are predicted from individuals within the vicinity of the site (noting grey seal abundances are low in this part of the MHW). However, on cessation of underwater noise sources from vessel movements and dredging grey seal will return to the affected area relatively quickly. Therefore, disturbance to the species is not considered significant.

*The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.*

7.2.7.3 Some short-term disturbance is predicted to potential prey fish species as a result of underwater noise emissions, although effects are not considered to be significant ensuring that the project will not affect prey species populations being maintained in the long term.

### 7.2.8 Harbour Porpoise associated with West Wales Marine cSAC

#### Injury

7.2.8.1 The injury threshold criteria adopted for the impulsive noise sources were based on those proposed in NOAA (NMFS, 2018) and are presented in Table 7.1. Based on the modelling undertaken, the resultant PTS injury ranges for the proposed impact piling activities on harbour porpoise are predicted to 3 m for Peak SPL, with no injury predicted based on the SEL cumulative threshold.

**Table 7.2: Summary of injury ranges for marine mammals due to impact piling (N/E = threshold not exceeded) in accordance with adopted SEL and Peak thresholds.**

| Species / Group | Threshold (Weighted $SEL_{cum}$) | Range | Threshold (Peak SPL) | Range |
|---|---|---|---|---|
| High frequency (HF) cetacean (harbour porpoise) | 155 dB re 1 $\mu Pa^2s$ | *N/E* | 202 dB re 1 µPa (pk) | 3 m |

7.2.8.2 The injury threshold criteria adopted for the non-impulsive noise sources such as vibro-piling, dredging and vessel movements was 201 dB re 1 $\mu Pa^2s$ based on those proposed in NOAA (NMFS, 2018).

7.2.8.3 Based on the modelling undertaken, the resultant PTS injury ranges for the non-impulsive noise sources such as dredging and vessel movements, show that injury is predicted at a distance of up to 25 m for harbour porpoise.

7.2.8.4 It should be noted that the SEL injury ranges are based on a marine mammal being within that range of the vessel or dredging activity continuously over a 24-hour period. Consequently, it is considered that these ranges are over estimates and over precautionary. Injury from vibro-piling activities which is also considered to be a non-impulsive noise source is also not predicted to occur based on modelling undertaken.

#### Behaviour

7.2.8.5 Underwater noise modelling undertaken for the project (Appendix 6.2 of the ES) found maximum disturbance ranges for marine mammals for impact piling activities causing mild disturbance to be 2.8 km and for strong disturbance a distance of 251 m. For vibro-piling, disturbance could occur within 4 km of the source based on the 120 dB re 1µ Pa (rms) threshold. However, it should be noted that operational noise levels will not be dissimilar to those already experienced in the area which is already heavily trafficked. Consequently, this is likely to be an over estimate of disturbance range for vibro-piling activities.

7.2.8.6 For dredging and vessel movements non-impulsive sound threshold criteria was adopted. Disturbance to harbour porpoise could occur within 1.6 km, although as noted for vibro-piling operational noise levels will not be dissimilar to those already experienced in the area which is already heavily trafficked. Consequently, this is likely to be an over estimate of disturbance range for vessels and dredging.

7.2.8.7 Harbour porpoise are likely to be more sensitive to anthropogenic noise compared to other odontocetes (Ketten 2000, Lucke *et al.,* 2009). Both short-term (Thompson *et al.,* 2013a) and long-term displacement (Teilmann and Carstensen 2012), as well as changes in foraging behaviour (Pirotta *et al.,* 2014), have been reported as likely consequences of construction-related activity to this species. In addition, harbour porpoise are also likely to actively avoid vessels (Hermannsen *et al.,* 2014; Dyndo *et al.,* 2015).

7.2.8.8 A study on the effects of construction activities associated with a gas pipeline in Ireland on harbour porpoise, which included vessel movements and dredging, found that the occurrence of harbour porpoise was reduced on days where construction related activities were recorded. The study however did not find a direct correlation between the number of harbour porpoise and increased construction activity (Cullock *et al.,* 2016).

7.2.8.9 A study by Diederichs *et al.* (2010) found harbour porpoise to return to an area disturbed by dredging three hours following dredging finishing. Therefore, on the cessation of construction activities harbour porpoise will likely return to the affected area soon after.

### 7.2.9 Effects of Underwater Noise Emissions during Construction on COs of Harbour Porpoise of the West Wales Marine cSAC

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat*

7.2.9.1 Low levels of short-term disturbance to individuals (masking and avoidance) of the population within the vicinity of the project may occur during marine works construction activities over a period of approximately three weeks (noting that piling will be an intermittent occurrence within this period). However, this will not restrict the objective of the population being able to maintain itself as a viable component of its natural over the long-term, primarily due to the low level of occurrence of this species in the vicinity of Pembroke Port.

*There is no significant disturbance of the species.*

7.2.9.2 Low levels of masking and avoidance behaviour may occur on individuals within the vicinity of the site, although it is noted that this species only rarely occurs in the vicinity of Pembroke Port. However, on cessation of construction activities (e.g. piling and dredging), harbour porpoise will return to the affected area relatively quickly (< 5 hours). Therefore, disturbance to the species is not considered significant.

*The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.*

7.2.9.3 Some short-term disturbance is predicted to potential prey fish species although effects are not considered to be significant, ensuring that the project will not affect prey species populations being maintained in the long term.

### 7.2.10 Otter Populations with Pembrokeshire Marine SAC

7.2.10.1 A print of an otter was recorded in the silts below the dock wall in 2015 but there are no past records of sightings or more recent signs of otter activity. This indicates at least occasional

otter activity within the Port with the potential for use of the open water for hunting and as a dispersal route between areas of the SAC outside the Port.

7.2.10.2 There is no available data relating to the sensitivity of underwater hearing of otter; however, audiogram data for sea otter indicate that the peak underwater hearing sensitivity lies in the range 7 kHz to 16 kHz, and overall sensitivity levels are less than that of seal species (Ghoul and Reichmuth, 2014). Injury and disturbance ranges for grey seal are provided in section 7.2.5 which show injury is not predicted from piling activities and only within 4 m for dredging activities and vessel movements over a 24-hour period. Some disturbance is probable up to distances of 2.8 km for impact piling and 1.6 km from dredging and vessel movements, however these are considered precautionary given that noise levels are likely to be comparable with background levels in the vicinity of Pembroke Port and therefore some tolerance to underwater noise levels associated with the Port are assumed.

7.2.10.3 Indirectly, underwater noise can also impact upon otter through an effect on fish prey, which is an important source of energy for otter (e.g. Chanin, 2003; Lilies, 2003), although as discussed above for harbour porpoise and grey seal, these are not expected to be significant, with only short term, temporary and reversible effects on prey species predicted over a relatively limited area.

7.2.10.4 The low levels of short-term noise disturbance within the vicinity of the site during construction activities could affect individuals. The potential effect will be limited by working primarily during the day. Working in the marine environment will be tide limited with the potential for night time working, but underwater noise generation will be restricted to a period of approximately three weeks.

### 7.2.11 Effects of Underwater Noise Emissions during Construction on COs of Otter of the Pembrokeshire Marine SAC

7.2.11.1 Significant adverse effects on otter in the SAC are not predicted to occur as a result of underwater noise emissions during construction and there will be no effect on the relevant COs.

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat;*

7.2.11.2 This CO would not be affected by construction-related underwater noise associated with the proposed development. The otter population using the SAC has been increasing over the long term and construction noise will not affect this trend.

*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;*

7.2.11.3 It is expected that any potential disturbance impact would be limited to a small section of the frontage of the Port and with the potential avoidance of the area of open water up to 250m from the working area intermittently during the three week construction period in the marine environment. This could result in short term, intermittent and highly localised behavioural

effects on fish prey (should an effect occur at all) but would not result in a significant impact on the ability of otter to hunt for fish in its home range.

7.2.11.4 This precautionary distance of 250 m does not take into account and current operational use of the Port and ferry terminal and the habituation by otters to the associated noise. With very extensive home ranges, there will be no significant disturbance impact on otter or change to the natural range as a result of underwater noise during construction.

*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.*

7.2.11.5 Considering the extent of an otter's typical home range and that the potential for displacement is temporary short-term and limited in extent, there will not be a significant impact on the availability of habitat and resources for otter.

7.2.11.6 Therefore, the otter would continue to be able to access sufficiently large habitat and resources to maintain its population in the SAC in the long term.

## 7.3 Airborne Noise Emissions during Construction

7.3.1.1 The record of an otter print in the silts below the dock wall indicates at least occasional activity within the Port, but surveys have confirmed absence of features with the potential to be used as a resting site by otter within the site.

7.3.1.2 Any activities that generate significant night time noise between dusk and dawn will have the potential to effect individual otter dispersing along the base of the dock wall or in the open water in the Port.

7.3.1.3 Otter can tolerate considerable levels of human disturbance within their home range. They have been recorded in cities and towns throughout the UK and have reportedly bred regularly under the islands' ferry terminals and jetties of one of Europe's largest oil terminals at Sullom Voe (Green and Green, 1997: cited in Chanin, 2003).

7.3.1.1 It is predicted that the onshore construction works will be carried out over several years. The proposals have the potential to result in low levels of temporary disturbance to any individuals active in the vicinity of the noise generating activities associated with the project.

7.3.1.2 As an active Port, the background levels of noise within and adjoining the site will be periodically elevated with the movement of vessels associated with the ferry terminal. Individual otters which periodically hunt in or disperse though the Port will be habituated to existing operations and the noise generated by them.

7.3.1.3 Guidance in the Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2001) suggest that a buffer zone of at least 30 m (or 100 m from greater impact works such as piling) should be provided around a non-breeding holt or resting site, to minimise the risk of significant disturbance to otter from airborne noise.

7.3.1.4 There is no potential for a resting place within the terrestrial areas of the Port, which is comprised of extensive of hardstanding/buildings with the localised areas of scrub and grassland isolated from the open water by active operational sites.

7.3.1.5 In the absence of potential resting places within the site, and the construction being primarily daytime activities, there is very limited potential for effects on the otter population

### 7.3.2 Effects of Airborne Noise Emissions during Construction on COs of Otter of the Pembrokeshire Marine SAC

7.3.2.1 Significant adverse effects on otter in the SAC are not predicted to occur as a result of airborne noise emissions during construction and there will be no effect on the relevant COs.

7.3.2.2 *The population is maintaining itself on a long-term basis as a viable component of its natural habitat;*

7.3.2.3 There could be minor modifications to activity and behaviour as a result of construction noise, but the temporary nature of the works and low levels of effect will not have the potential to affect the status of the otter population utilising habitats in the Pembrokeshire Marine SAC.

7.3.2.4 Therefore, this CO would not be affected by construction-related noise associated with the proposed development. The otter population using the SAC is stable or increasing over the long term.

*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;*

7.3.2.5 It is expected that any potential disturbance impact would be limited to the area below the dock wall. Noise generating activities associated with the proposed development will be primarily undertaken during the day when otters will not be active at the site and there are no resting places within 30m of the site.

7.3.2.6 Otter are tolerant of airborne noise and the extent of any potential displacement impacts would be limited to the dock frontage and operational land within the Port of negligible value to otter. The proposed development will not create any barriers to movement.

7.3.2.7 Therefore, the natural range of the otter of the SAC would not be reduced as a result of airborne noise during construction.

*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.*

7.3.2.8 Considering the size of the home ranges, any temporary short-term, limited displacement would not be expected to have a significant impact on otter with regard to the availability of habitat and resources. Therefore, the otter would continue to be able to access sufficiently large habitat and resources to maintain its population in the SAC in the long term.

## 7.4 Increased Human Presence during Construction

7.4.1.1 As an active Port and ferry terminal there is significant daily human activity which will continue outside of the standard daytime working hours and overlap periods when otters will be active (dusk and early morning). There is no screening (scrub vegetation, walls, fences) between the operational areas and the open water and otters utilising the intertidal zone and open water below the dock wall will be habituated to site activities.

7.4.1.2 Human activity can cause disturbance to otters. The potential for human activity to affect otter behaviour is reported to be widespread in the Pembrokeshire Marine SAC (NRW, 2018). Walkers on the coastal footpath and recreation on the foreshore are the principle drivers for disturbance in the SAC. Dog walking along the coast in the early morning and dusk, when otters are most active, is likely to be the most frequent form of disturbance for the otter population and these effects are concentrated in residential and urbanised areas.

7.4.1.3 During the construction period, the levels of human activity at the dock frontage will periodically be significantly higher than the baseline operational levels. During working periods outside of daytime hours otters could avoid the intertidal marine habitat closest to the dock wall or around works from a barge. The need for night time working in the marine environment and on slipways would be dictated by the tides and would be short term in nature.

### 7.4.2 Effects of Increased Human Presence during Construction on COs of Otter of the Pembrokeshire Marine SAC

7.4.2.1 Significant adverse effects on otter are not predicted to occur as a result of increased human presence during construction and there will be no effects on the relevant COs.

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.4.2.2 Short periods of localised modified behaviour close to the dock wall as a result of human activity associated with construction activities will not change the stability of the otter population or its ability to increase in size over the long term.

*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.*

7.4.2.3 Taking into account the ability of otter to tolerate considerable levels of human disturbance, and the limited extent to which activities will be undertaken at times when otters would be actively hunting or passing through the Port, it is considered that there would be no impact on the natural range of the population.

*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.*

7.4.2.4 There will be no impact on the distribution, abundance and population dynamics of the otter population within the SAC and the proposed development will not affect the population's stability or ability to increase in the future.

## 7.5 Artificial Lighting during Construction

7.5.1.1 To minimise the impact of light spill the lighting will be designed to meet the requirements of the specific construction tasks and would be set at a low level wherever practicable.

7.5.1.2 The two existing slipways, Graving Dock and adjoining land are largely unlit at night but there are tall lighting columns around the existing operations at the western end of the Port frontage lighting the operational area, with light spill onto the adjoining parts of the Port edge (outside the site).

7.5.1.3 Construction will be primarily during the day, outside hours when otters are typically active. Occasional night time working may be required where there are tidal restrictions on working.

### 7.5.2 Effects of Artificial Lighting during Construction on COs of Otter of the Pembrokeshire Marine SAC

7.5.2.1 Significant adverse effects on otter are not predicted to occur as a result of increased human presence during construction and there will be no effects on the relevant COs.

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.5.2.2 During periods of night time working there could be minor modifications to otter activity and behaviour as a result of artificial lighting required for construction activities but the temporary nature of the works and low levels of effect will not prevent the otter population from maintaining itself as a component of the Pembrokeshire Marine SAC.

*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;*

7.5.2.3 It is considered that the artificial lighting where needed for construction would not have any significant impact on the otter home range or behaviour and, therefore, the otter population and its ability to increase in size over the long term would not be affected

*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.*

7.5.2.4 Artificial lighting will not result in a reduction in the extent or diversity of habitats available to the otter population and will not affect the current or future otter population size.

## 7.6 Artificial Lighting during Operation

7.6.1.1 It will be necessary to achieve the lighting levels required under the Docks Regulations. Accordingly, the detailed lighting scheme will ensure that each part of the Port being used for

Port-related operations will be 'suitably and adequately lighted' and that every obstacle or hazard which is likely to be dangerous when vehicles lifting appliances or people move shall be made conspicuous and will be suitably lit.

7.6.1.2 Otter can tolerate considerable levels of artificial lighting being known to travel through built-up areas, but it is recognised that lighting can present a disturbance impact (Highways Agency, 2001).

7.6.1.3 Operational land in the north-western part of the Port, outside of the site, is floodlit with light spill below the jetty. Permanent artificial lighting at the dock wall following the proposed development will locally increase the extent of light spill at the base of the dock wall.

7.6.1.4 The proposed development has the potential to result in a permanent localised increase in artificial lighting on the frontage of the dock with the potential to have a very minor effect on otter whose territories overlap this area (one or two individuals).

7.6.1.5 There is a risk of a permanent localised modification to behaviour in the immediate vicinity of sections of the dock frontage subject to light spill, but the recorded use of operational areas elsewhere in the UK (see paragraph 7.3.1.3) makes this outcome unlikely.

### 7.6.2 Effects of Artificial Lighting during Operation on COs of Otter of the Pembrokeshire Marine SAC

7.6.2.1 Significant adverse effects on otter in the SAC are not predicted to occur as a result of artificial lighting during operation with no effect on the relevant COs.

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.6.2.2 This CO would not be affected by lighting during the operation phase.

*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.*

7.6.2.3 Measures will be taken in the site design to minimise light spill onto the open water/intertidal zone and lighting will not create a barrier to movement. Artificial lighting during operation would not be expected to affect the natural range of the otter population in the SAC.

7.6.2.4 *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.*

7.6.2.5 Lighting during operation will have no significant impact on the amount of habitat available for maintaining the otter population in the SAC on a long-term basis.

## 7.7 Accidental Pollution Events during Construction

7.7.1.1 There is the potential for the accidental release of pollutants into the marine environment during construction works, as a result of accidental spillage or leakage for example. Pollution may

include diesel oil, leachates from cements and/or grouts used in construction and synthetic chemicals.

7.7.1.2 In the unlikely event that pollutants were to enter the MHW during the construction phase they would be rapidly dispersed on the surface and in the water column and subject to twice daily tidal flushing, and so any effects on water quality would be limited.

### 7.7.2 Embedded Mitigation

7.7.2.1 The proposed development would include measures to control pollution during construction and these would be set out in a Construction Environmental Management Plan (CEMP). Adherence to these measures, standard best practice guidance and Environment Agency Pollution Prevention Guidelines would significantly reduce the likelihood of an accidental pollution incident occurring and impacting the waters contained within the identified designated sites. Appropriate measures would include: designating areas for refuelling; storage of chemicals in secure designated areas in line with appropriate regulations and guidelines; double skinning of any tanks and pipes containing hazardous substances; and storage of hazardous substances in impervious bunds.

7.7.2.2 In addition, during the works, port activities will continue which are currently regulated by the HSE and the Environment Agency under the Health and Safety at Work Act 1974. The requirement to risk assess is carried out by MHPA under their stated compliance with the Port Marine Safety Code. In terms of emergency or crisis management, MHPA has effective procedures in the form of spill response procedure to handle potential emergency scenarios.

### 7.7.3 Benthic Habitats associated with the Pembrokeshire Marine SAC

7.7.3.1 Estuarine habitats associated with the Pembrokeshire Marine SAC include reef habitats and intertidal mudflats and sandflats. Effects of an accidental pollution event on the species of identified habitats would be depend on the extent of the spill and the toxicity of the pollutants released. Low energy intertidal sediments are generally more susceptible to chemical pollution than high energy coastal environments. Furthermore, the low dispersion within these areas may result in them acting as sinks for pollutants and heavy metals, as a result of them becoming adsorbed onto fine sediments and organic particulates (Clark, 1997).

7.7.3.2 Some of the component species of the *Hediste diversicolor* and *Limecola balthica* in intertidal sandy mud have been found living in contaminated estuarine sediments. The intolerance of component species to impacts of this nature is typically high, and bivalves in particular may experience mortality following an accidental contamination event. Recovery of the sediment requires dilution, biodegradation or removal of the contaminant from the sediments. Therefore, chemicals may persist for some time and it is likely that severe contamination will lead to declines in species richness although recoverability will typically be high (Tyler-Walters, *et al.* 2019).

7.7.3.3 While associated flora and fauna communities could be affected by an accidental pollution event, the volumes of pollutants would likely be small enough to not cause a significant effect

on the COs of the SAC. In addition, the embedded mitigation described would ensure that the likelihood of an event occurring would be very low.

### 7.7.4 Effects of Accidental Pollution Events during Construction on COs of Benthic Habitats of Pembrokeshire Marine SAC

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

7.7.4.1 Due to the very low likelihood of a significant pollution event from the proposed development and considering the embedded measures to minimise the risk and severity of such an event should it occur, the distribution and extent of habitat features will not be affected and therefore will remain stable or increasing in the future.

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

7.7.4.2 Some localised effects on habitat function may be observed following an accidental pollution event, however implementation of the embedded mitigation measures will ensure the likelihood of an event is extremely low and the severity of such an event should it occur would also be low. Therefore the structure and function of identified habitat features will not be degraded.

*The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded.*

7.7.4.3 The embedded mitigation measures will ensure a very low likelihood of an accidental event occurring and a low severity should one occur, and as a result the habitat quality will not be degraded by the project.

### 7.7.5 Migratory Fish associated with Pembrokeshire Marine SAC and Cleddau Rivers SAC

7.7.5.1 Accidental spillage of chemicals and substances from construction compounds and activities (including vehicles and equipment operating near to watercourses) may impact on fish species, resulting in behavioural effects such as avoidance of affected areas and barriers to migration. Chemical spills may also have sub-lethal to lethal effects dependent on the spatial and temporal extent of the exposure and the level of toxicity.

7.7.5.2 The sensitivity of fish species will vary depending on a range of factors including the pollutant, species and life stage involved, with fish eggs and larvae likely to be particularly sensitive (Westernhagen, 1988). As only adult and juvenile fish species are likely to be in the vicinity of the construction works, they are considered less likely to be affected by marine pollution due to their increased mobility. There is also evidence that fish have the ability to detect (and therefore avoid) oil contaminated waters through olfactory (smell) or gustatory (taste) systems (Claireaux *et al.* 2017).

### 7.7.6 Effects of Accidental Pollution Events during Construction on COs of Migratory Fish Species of Pembrokeshire Marine SAC

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.7.6.1 Given the low volumes of pollutants that will be used during the project, the low likelihood of a spill occurring, and the highly mobile nature of migratory fish populations associated with the SAC, the ability for the population to maintain itself in the long term will not be affected.

*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.*

7.7.6.2 Due to the embedded mitigation measures which will minimise the likelihood and severity of accidental spillage events, the natural range of migratory fish populations will not be reduced within the SAC for the foreseeable future as a consequence of accidental pollution events.

*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.*

7.7.6.3 Due to the embedded mitigation measures which will minimise the likelihood and severity of accidental spillage events, there is a very low likelihood of an accidental event occurring, which will ensure that the presence, abundance, condition and diversity of habitats and species which support the relevant Annex II species will not be degraded by the proposed development.

### 7.7.7 Effects of Accidental Pollution Events during Construction on COs of Migratory Fish Species of Cleddau Rivers SAC

*The population of the feature in the SAC must be stable or increasing over the long term.*

7.7.7.1 Movement of Annex II migratory fish populations past the site would not be restricted by potential accidental pollution events given the low volumes of pollutants that will be used, proposed mitigation to minimise the potential for such an event (and the severity of the event should this occur) and the highly mobile nature of the fish species. The population of the relevant Annex II fish species of the SAC will therefore not be affected.

*The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.*

7.7.7.2 Due to the embedded mitigation measures which will minimise the likelihood and severity of accidental spillage events, the natural range of migratory fish populations will not be reduced within the SAC (particularly the ability of fish to migrate to/from the SAC past Pembroke Port) for the foreseeable future as a consequence of accidental pollution events.

*Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.*

7.7.7.3 Passage of Annex II migratory fish populations past the site would not be restricted by potential accidental pollution events given the low volumes of pollutants that will be used, proposed

mitigation to minimise the potential for such an event (and the severity of the event should this occur) and the highly mobile nature of the fish species.

*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.*

7.7.7.4 The proposed development will not result in direct impacts on the Cleddau Rivers SAC and therefore there is no potential for effects on this CO.

## 7.7.8 Otter Associated with Pembrokeshire Marine SAC

7.7.8.1 The otter is a top predator and vulnerable to the accumulation of toxic contaminants present within their food chains, if prey items contain pollutants, particularly those that are persistent or accumulate over time, without being broken down by the otter. European eels, a key prey species for otter, have the potential to be substantially impacted by a range of contaminants, however otter are known to prey on a range of other marine species present within the SAC.

7.7.8.2 As outlined in previous sections, the volumes of pollutants expected to be used as part of the proposed development are predicted to be very low. In addition, the embedded measures outlined in section 7.7.2 will minimise the likelihood of a spill occurring and will reduce the severity of a pollution incident, in the unlikely event that one should occur. Any pollution event would therefore be temporary in nature and would not result in significant contamination such that it would have an effect on otters within the SAC.

## 7.7.9 Effects of Accidental Pollution Events during Construction on Otter in the Pembrokeshire Marine SAC

*The population is maintaining itself on a long-term basis as a viable component of its natural habitat.*

7.7.9.1 As outlined above, the embedded mitigation measures would minimise the risk and severity of any accidental pollution events associated with the proposed development. As such, there will be no effect on the otter population's ability to maintain itself on a long term basis as a viable component of its natural habitat.

*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.*

7.7.9.2 The natural range of otter population within the SAC will not be reduced as a consequence of an accidental pollution event, considering the embedded mitigation which will reduce both the likelihood and the severity of accidental pollution from the proposed development.

*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.*

7.7.9.3 Due to the embedded mitigation measures which will minimise the likelihood and severity of accidental spillage events, there is a very low likelihood of an accidental event occurring, which

will ensure that the presence, abundance, condition and diversity of habitats and species which support otter within the SAC will not be degraded.

# 7.8 Liquid Discharges during Construction

## 7.8.1 Benthic Habitats Associated with Pembrokeshire Marine SAC

### Suspended Sediment Concentrations and Sediment Deposition during Dredging

7.8.1.1 Capital dredging of the slipway footprint to allow for installation of the slipway and removal of sediments within the Graving Dock will result in dredging of a total volume of up to 44,500 $m^3$ of substrate. The material from the Graving Dock will be removed in dry conditions following installation of a cofferdam and associated dewateringFollowing completion of dewatering the material will be removed using an excavator, with the material reused within the development footprint where possible. Material not suitable for re-use will be removed and disposed at a licenced inshore facility or offshore within a licenced disposal ground. Material associated with construction of the slipway will require removal of 36,000 $m^3$ of substrate to a depth of 6 m (Table 13) using a backhoe excavator over a period of 3 weeks.

7.8.1.2 During dredging, increases in suspended sediments can occur as the physical action of removal of sediments from the dredge footprint mobilises sediments into the water column. The increase in suspended sediment can cause attenuation at the seabed for species that rely on photosynthesis for survival. In addition, as sediments fall out of suspension smothering effects on benthic species, such as restrictions to feeding or respiratory apparatus can occur.

7.8.1.3 Studies undertaken within MHW indicate that sediment with high concentrations of silt particles such as those within the proposed dredge footprint can extend up to 5 km on a spring flood tide and 1.5 km on a spring ebb tide. Another study that measured sediment plumes arising from dredging works showed neap tide sediment plumes extended 500 m on an ebb tide and 1750 m on a flood tide before interacting with a third party dredge plume which was found to extend a further 500 m -750 m (Little *et al.,* 2015).

7.8.1.4 For dredging of the slipway area and Graving Dock sediment plumes are unlikely to extend as far as those previously reported within MHW for the following reasons:

1. The dredging of Graving Dock will be encapsulated by a cofferdam, and as such there will be no migration of plumes from dredging of the Graving Dock (removal of 8,500 $m^3$ of material);
2. The physical presence of the existing Carr Jetty to the west and Hobbs Point to the east will likely reduce localised tidal currents that would support plume migration;
3. Gravel and sand fractions within the sediments to be dredged which fall out of suspension more rapidly; and
4. Use of a backhoe dredge which is considered to have low physical action compared with more rigorous dredging activities such as trailing suction hopper dredge, cutter suction dredge and water injection dredging.

7.8.1.5 Therefore, mobilised sediments from dredging, of which low volumes are predicted, due to the proposed dredge methods described above, will likely become more concentrated within a constrained area adjacent to the proposed dredging works rather than extend into the SAC.

7.8.1.6 In addition, suspended sediment concentrations (SSCs) will likely return to background levels relatively quickly due to sediments falling out of suspension, the low volume of dredge material to be removed and short term and temporary nature of proposed dredging works. As such, any increases in SSC will be temporary, short-lived and largely confined within Pembroke Port.

7.8.1.7 Sediment deposition as sediment particles fall out of suspension are predicted to be low. Previous dredging activities within MHW have identified deposition levels of between 1.2 mm and 4.3 mm (Little *et al.,* 2015). Generally, it is considered between 3% and 7% of fine material (mud) becomes mobilised at the dredge source during backhoe dredging which is not retained for disposal (Burt *el al.,* 2007; Land *et al.,* 2007). Based on a volume of 22,500 $m^3$ of fine material (based on physical sediment sample displaying 74% silt and clay fractions) from the slipway footprint (material from the Graving Dock has been excluded due to installation of a cofferdam restricting the migration of a sediment plume) a volume of 675 $m^3$ and 1,575 $m^3$ of fine material (mud) will become mobilised and deposited outside the dredge footprint. Some potential sediment dispersion outside the footprint may also be possible from fine sand sediments not included in the calculations provided above, however, these larger fractions are likely to settle out of suspension quickly following mobilisation.

7.8.1.8 Typical species of featured sand and mudflats habitats such as *Hediste diversicolor, Limecola balthica,* Cirratulidae worms and *Cerastoderma edule* species, are likely to be adapted to increases in suspended sediment concentrations (Tillin and Rayment, 2016; Tillin and Marshall, 2016). Other tolerant species present within the SAC include polychaete species such as *Melinna palmata* and *Chaetozone gibber,* which have high growth rates and short life spans (De-Bastos, 2016).

7.8.1.9 Suspension feeders such as *Abra alba*, may however be vulnerable to increases in SSC if feeding apparatus becomes clogged, however, this species can also switch to surface deposit feeding if necessary and therefore is considered to be also tolerant to increases in SSC (Budd, 2007). In addition, potentially vulnerable photosynthetic eelgrass communities associated with mudflats and sandflats of the SAC are unlikely to be affected given the short duration of proposed dredging and low levels of sediment deposition predicted.

7.8.1.10 Algae communities and benthic epifauna of featured subtidal rock reef habitat feature may have low resilience to the effects of increased SSC as reduced light availability can inhibit photosynthesis and limit the depth range at which algae grow. However, this effect is highly unlikely, given the short term and temporary nature of proposed dredging and the low volumes of sediment to be dredged. An increase in sediment deposition could provide a physical barrier to spat settlement and smother sessile epibenthos. *Sabellaria spinulosa*, a characteristic species of subtidal reefs found within the MHW, has high resilience to smothering and whilst there may be some curtailment of feeding and growth, recovery is likely to occur almost immediately following cessation of the impact (Jackson and Hiscock, 2008).

## Release of Contaminants during Dredging and Dewatering

7.8.1.11 During dredging and dewatering activities any contaminants bound to dredge sediments or dissolved within discharge water have the potential to be released into the water column. Dependent on the concentrations of contaminants released, acute of chronic toxic effects may occur to species associated with habitats of the SAC.

7.8.1.12 Capital dredging associated with the slipway and within the Graving Dock will remove up to 8,500 $m^3$ of substrate. At least 50% of the dredge material would be removed in dry conditions from the Graving Dock, which reduces the potential for release of sediments and therefore contaminants into the water column.

7.8.1.13 Sediment samples collected within the proposed slipway found metal concentrations were above the threshold at which consideration and testing may be required before a decision can be made on disposal (CEFAS Action Level 1). The concentration of zinc was above the threshold which requires further consultation and may be unsuitable for sea disposal (CEFAS Action Level 2). Heavy metal concentrations within the Graving Dock were below CEFAS Action Level 1, with the exception of chromium and nickel which exceeded CEFAS Action Level 1 and copper and mercury which exceeded the Canadian Threshold Effect Level (TEL), above which biological effects are anticipated.

7.8.1.14 Organotins were also elevated within the footprint of the proposed mega-slipway. Polyaromatic hydrocarbons were present within the sampled sediments at both the slipway and Graving Dock but in all cases the concentrations were below the CEFAS Action Level 1. The Canadian TEL was, however, exceeded for naphthalene, acenaphthene and fluorine. Concentrations of polychlorinated biphenyls (PCBs) were below the CEFAS thresholds and the Canadian benchmarks for biological sensitivity at all locations.

7.8.1.15 While sediments exceed adopted guideline criteria thresholds for some heavy metals, the proposed dredge volume that will be exposed to receiving environment from the slipway area is considered small. Removal of the material by backhoe excavator will limit exposure of fine sediment to the water column and therefore the potential for contaminant elutriation. During dredge disposal increased flushing from tidal currents will assist with dilution of any contaminants released into the water column.

7.8.1.16 *Hediste diversicolor* is one of the key characterising species within the 'Mudflats and sandflats not covered by seawater at low tide' Annex I habitat. This species has been found living in estuarine environments with high levels of copper and its resistance to toxicity is likely to depend on its ability to detoxify the metal and store it in the tissues (Tillin and Rayment, 2016). Other estuarine polychaete species are also resilient to heavy metals, whilst bivalves, such as *Cerastoderma edule*, may decline in abundance if concentrations exceed a critical level (Tillin and Marshall, 2016).

7.8.1.17 Seagrass beds, also expected to occur within the 'Mudflats and sandflats not covered by seawater at low tide' Annex I habitat, may accumulate some synthetic contaminants with no observable damage, whilst other chemicals, including naphthalene may reduce nitrogen

fixation in the plants. Similarly, growth of eelgrass may be inhibited by heavy metals although since the major route for uptake is through the leaves, this suggests that intertidal populations would accumulate less compared to subtidal populations due to their reduced exposure (Tyler-Walters, 2008). Increased contamination may inhibit seagrass growth although the infaunal community, characterised by polychaetes, amphipods and bivalves, may be relatively tolerant to contaminants due to baseline levels in the area.

7.8.1.18 Reef habitat within the wider MHW may experience a shift in community structure of component species due to elevations in contaminants, although the release of contaminants at any identifiable concentrations from the proposed dredging activities is considered to be unlikely. Any disturbance to limpets and barnacles on reef habitat is likely result in rapid recolonization although this will depend on processes such as larval supply and recruitment between populations.

7.8.1.19 The subtidal soft sediment communities within the vicinity of Pembroke Port are likely to be tolerant of increases in sediment contaminants as they exist already in a moderately disturbed environment. The characterising species are expected to be infaunal polychaetes, including *Melinna palmata* and *Chaetozone gibber* and amphipods *Ampelisca diadema* and *Photis longicaudata.* In addition, these species are unlikely to become exposed to very high levels of contaminants, given the small volume of sediments to be dredged. These species tend to have a high reproductive capacity and therefore recovery is likely following a disturbance event. Sand and mud subtidal habitats are therefore considered to have a low sensitivity to release of contaminants (De-Bastos, 2016).

7.8.1.20 In the wider MHW the subtidal mixed sediment is also characterised by polychaete worms, with amphipods and bivalves also abundant. Low level contamination is ubiquitous throughout the MHW and therefore communities will be tolerant to small increases in levels of pollutants. Like the polychaetes and amphipods, bivalves will vary in their tolerance to contaminants depending on the nature of the chemical. Mercury is likely to be the most toxic heavy metal to *A. alba* with lead less toxic (Budd, 2007). Hydrocarbons are considered to be the least problematic for bivalves in terms of contaminants, although high levels may cause decreased respiration rates and a decrease in feeding rate (Budd, 2007). Recovery rates are considered to be high for the component species of subtidal mixed sediment.

7.8.1.21 Given that dredging will occur over a short period of three weeks, the volume of sediments disturbed is small, the plume extent is likely to be small and all dredge disposal will be within a licensed disposal facility, impacts from the release of contaminants on SAC features habitats are expected to be minimal. In addition, any elutriation of contaminants into the water column will be effectively diluted to background levels almost immediately ensuring that any no toxic effects will be observed.

7.8.1.22 Other potential sources of contaminant release during construction are from dewatering discharge activities associated with the Timber Pond. The water of the Timber Pond has been found to contain low contaminant levels and have similar physical properties to that of saline water from the surrounding MHW. Generally, contaminant concentrations were below levels of

detection. Metal concentrations were above levels of detection but were relatively low. The dewatering of the marine water that remains within the Graving Dock following installation of the cofferdam will not cause increase in contaminants in the receiving water column following discharge as sediments will be not be disturbed until dewatering has been completed. There will therefore be no effect on water quality as a result of dewatering discharges from the Graving Dock or Timber Pond and therefore this has not been assessed further.

### 7.8.2 Effects of Liquid Discharges during Construction on COs of Benthic Habitats of Pembrokeshire Marine SAC

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

7.8.2.1 Dredging activities, including release of sediment bound contaminants will not affect the distribution or extent of identified Annex I habitat features as any effects will be temporary and reversible, with most effects (e.g. plume effects and sediment deposition) restricted to the immediate vicinity of Pembroke Port.

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

7.8.2.2 Proposed dredging activities will not affect the physical, chemical and biological structure and function of identified Annex I habitat features, given the short-term duration and temporary nature of the works, the small extent (largely restricted to the immediate vicinity of Pembroke Port) and low sensitivity of identified habitats and species.

*The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded.*

7.8.2.3 Typical species associated with featured habitats will not be affected by proposed dredging activities, due to the short term, temporary nature of the works and the small scale of any effects and, as such, habitat quality of the Annex I habitats will not be degraded within the SAC.

## 7.9 In-combination Effects during Construction

7.9.1.1 The other developments (projects/plans) that could result in-combination effects with the proposed development on features of the designated sites identified have been summarised in Table 7.3. Their locations are shown in Figure 7.1.

**Table 7.3: Projects and Activities Considered for Assessment of In Combination Effects.**

| Project (Developer) | Spatial Overlap | Temporal Overlap | Description and proposed development activities | Further Assessment required? | Justification |
|---|---|---|---|---|---|
| Dredging and disposal sites | Partly (see next column in **bold**) | Yes | DML1743 – Dredge and disposal from Neyland Marina, 2017-2020 (Neyland Yacht Haven ltd.), **spatial overlap**;<br>DML1646 – Milford Haven maintenance dredging, 2017-2022 (MHPA). Annual volume 5500 $m^3$, **spatial overlap**, see **Error! Reference source not found.**.<br>RML1462 - Dredging a 32 m x 20 m approach channel in relation to the construction of a new lock structure in relation to the proposed Martello Quays sites, 2017-2022 (The Conygar Investment Company plc). Annual volume 9500 $m^3$. **No spatial overlap** | Yes | Sediment plumes generated from placement of material in identified disposal ground and dredging activities may present potential cumulative effects with proposed development activities. There may also be a potential for cumulative impact from increased underwater noise from dredging and disposal activities. |
| Deployment of scientific equipment and marker buoys (University College of Swansea) - DEML1845 | No | Yes | Deposition and subsequent removal of marker buoys with environmental monitoring and mid-water settlement plates, 2018-2019 | No | No spatial overlap and impact pathway identified. |
| Martello Quay (Martello Quays Ltd.) - LPA Ref: 07/0020/CA | Yes | No | Planning permission was approved by PCC in February 2008. The project includes up to 260 marina berths and associated car parking; marine workshops and a chandlery; 450 houses and apartments; a new public promenade; shops; a pub and restaurant; a hotel; and a five-screen multiplex cinema. | No | There is a high level of uncertainty with regards to timescales, EIA and project construction works, considering no progress has been made since the permission was granted in 2008. As a result, this project has been scoped out. |
| Marine Energy Test Area 1 (Pembrokeshire Coastal Forum) | Yes | Yes | The project will provide five testing sites located within Pembroke Port to support testing and monitoring of marine energy components and subassemblies. Testing activities includes mobilisation and demobilisation of vessels, deployment and monitoring of components/subassemblies. Components and sub-assemblies will be deployed to the seabed, on the surface or within water column. | Yes | Testing and monitoring activities are likely to be undertaken during construction and operation of the proposed development. There is also potential for cumulative impacts on identified marine receptors |
| Marine Energy Test Area 2 (Pembrokeshire Coastal Forum) | Yes | Yes | The project will provide three testing sites located within MHW to support testing and monitoring of marine energy devices. Testing activities includes mobilisation and demobilisation of vessels, deployment wave and tidal energy | Yes | Testing activities are likely to be undertaken during construction and operation of the proposed development. There is also potential for cumulative impacts on identified marine receptors |

| Project (Developer) | Spatial Overlap | Temporal Overlap | Description and proposed development activities | Further Assessment required? | Justification |
|---|---|---|---|---|---|
| | | | devices. Devices will be deployed to the seabed, on the surface or within water column. | | |
| Pembrokeshire Wave Energy Demonstration Zone (Wave Hub Ltd.) | No | Yes | The project entails the development of 90 $km^2$ of seabed with water depths of approximately 50 m and a wave resource of approximately 19 kW/m; to support the demonstration of wave arrays with a generating capacity of up to 30MW for each project. Consent for this project could be achieved in 2022, infrastructure could be built by 2024 and the first technology could be installed in 2025. | No | There is no spatial overlap with the proposed development. |
| Mixed used development (MHPA) - LPA reference: 14/0158/PA | No | Yes | Demolition of several existing buildings and the mixed-use redevelopment of Milford Waterfront comprising up to 26,266 $m^2$ of commercial, hotel, leisure, retail and fishery related floorspace. Up to 190 residential properties, up to 70 additional marina berths, replacement boat yards, landscaping, public realm enhancements, access and ancillary works. A decision on this application is yet to be made by PCC. | Yes | Given the distance from the project and likely impact pathways. There is potential for cumulative impacts to affects the marine environment. |
| Cable Interconnector (Greenlink) - Welsh Government reference: qA1296053<br>Ground investigations - RML1827 | No | Yes | The project is a 500MW subsea electricity interconnector linking the power markets in Ireland and Great Britain and is planned for commissioning in 2023. As an EU Project of Common Interest, it is one of Europe's most important energy infrastructure projects. The interconnector is planned to make Landfall at Freshwater West beach to the south of the mouth of the MHW.<br>A marine licence application was submitted in 2018 and is pending decision, for marine Ground Investigations and for the Interconnector. | No | There is no spatial overlap with the proposed development. |
| Combined Heat and Power (CHP) Cogeneration Unit at Pembroke Refinery Welsh Government reference: qA1312073 | No | Yes | The project is to provide the refinery's electrical power and support its steam demands. Valero has configured the project to efficiently generate electricity whilst using the waste heat arising from this combustion process to produce super-heated steam for use within the refinery. The use of waste heat and the production of steam usefully increases the overall efficiency of the electrical generation plant. | No | There is no spatial overlap and no impact pathway to identified marine receptors |

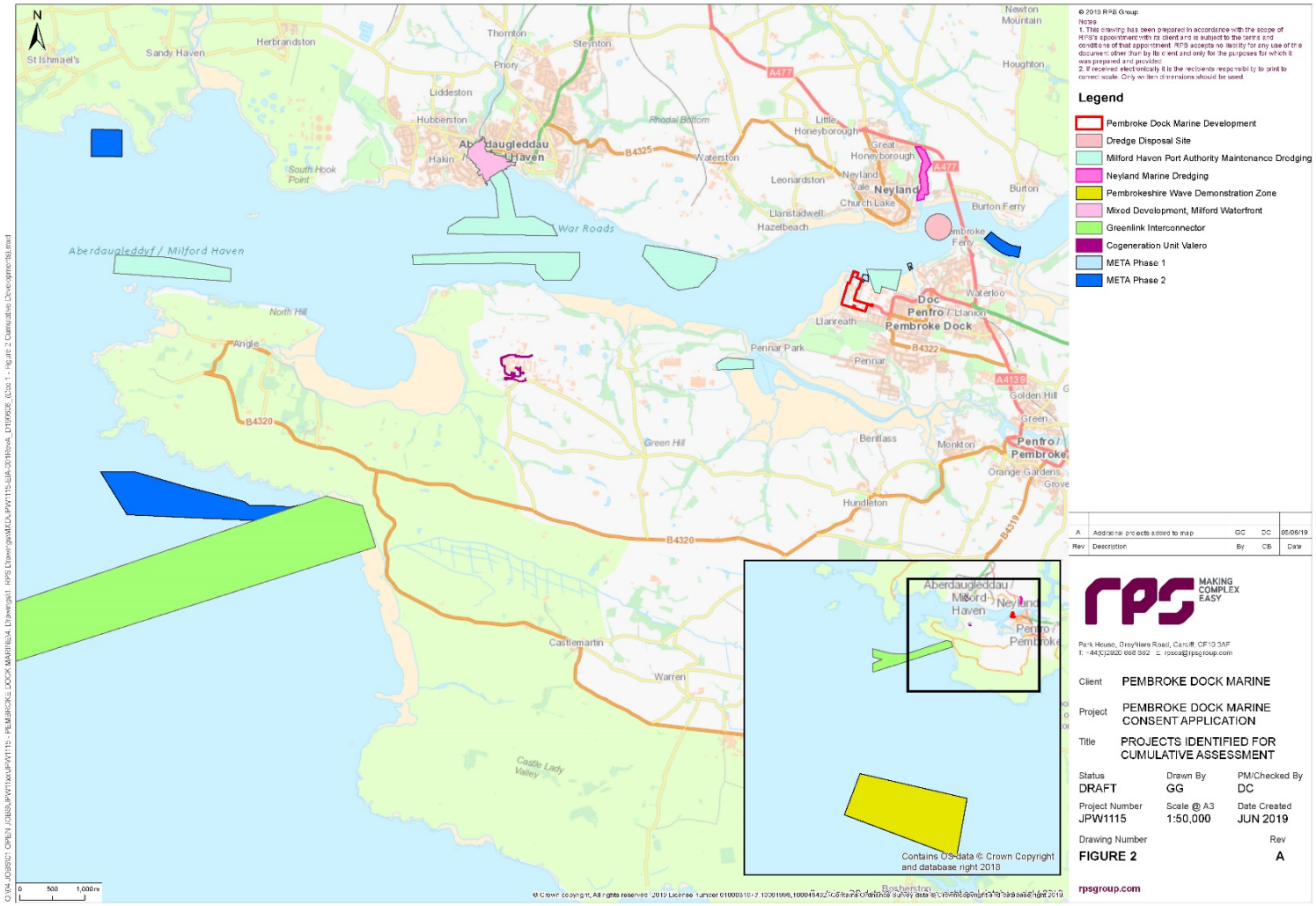


**Figure 7.1: Location of projects and activities that have been considered for cumulative impact assessment**

7.9.1.2 The following projects and their associated activities have been taken forward into the in combination assessment:

- Dredging and disposal sites;
- Marine Energy Test Area 1 and 2; and
- Mixed used development.

7.9.1.3 The potential impact pathways assessed in Sections 7.2 to 7.8 (inclusive) have been considered, and the in-combination effects assessment undertaken is presented below.

## 7.9.2 Benthic Habitats associated with Pembrokeshire Marine SAC

7.9.2.1 There are no impacts predicted on featured benthic habitats associated within the Pembrokeshire Marine SAC from the proposed development from increases in suspended sediment concentrations and sediment deposition during dredging. Dredging works associated with the proposed development will be completed over a period of three weeks and therefore the potential for a temporal overlap with other projects such as MHPA's maintenance dredging program is unlikely. On completion of identified dredging projects suspended sediment concentrations will return to background conditions relatively quickly due to tidal flushing of the MHW. Given the relatively low dredge volumes estimated sediment deposition will also be low and therefore smothering effects will be insignificant.

7.9.2.2 Low levels of increased suspended sediment are likely to be generated during META Phase 1 and 2 as part of vessel movements and operation of turbine devices for META Phase 2. These events will be highly localised, short term and temporary.

7.9.2.3 The species associated with featured benthic habitats of the SAC such as intertidal and subtidal mudflats and sandflats will also be relatively tolerant to periodic increases in suspended sediment and sediment deposition as featured habitats often experience these types of events naturally following a storm or spring tide.

7.9.2.4 An assessment of the in-combination effects associated with featured benthic habitats of the Pembrokeshire Marine SAC against the COs for these features is provided in Table 7.4.

**Table 7.4: Summary of in combination effects on qualifying benthic habitats of the Pembrokeshire Marine SAC COs.**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. | Increased suspended sediment concentrations and sediment deposition from dredging and disposal | Predicted sediment plume migration causing increases in suspended sediments is predicted to be minor given the proposed dredge volume and dredging period. Given the short timeframe, temporal overlap from other projects is not expected. Conditions will return to background levels relatively quickly due to hydrodynamic conditions within the SAC. Therefore distribution and extent of featured habitats will be not be affected. | No potential for an adverse effect to achieving the conservation objective |
| The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. | Increased suspended sediment concentrations and sediment deposition from dredging and disposal | Some minor changes to sediments associated with featured habitats from deposition of dredge sediments are predicted in the short terms although levels are likely to be low given the small dredge volumes that are proposed. No adverse effects to biological or chemical functions of featured habitats are predicted. | No potential for an adverse effect to achieving the conservation objective |
| The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. | Increased suspended sediment concentrations and sediment deposition from dredging and disposal | Species associated with featured habitats will be tolerant to some extent of increases in suspended sediment concentrations. | No potential for an adverse effect to achieving the conservation objective |

### 7.9.3 Grey Seal associated with Pembrokeshire Marine SAC

7.9.3.1 Grey seals are occasionally sighted in the MHW within the vicinity of Pembroke Port. Minor disturbance effects such as avoidance and masking of communication are predicted for the proposed development activities from vessel movements and dredging with the overall impact considered to be not significant. Similar effects may also arise due to vessel and dredge activities from the cumulative projects identified. Potential effects may extend for a longer duration and a larger area if a temporal overlap is assumed.

7.9.3.2 An assessment of the in-combination effects associated with featured grey seal of the Pembrokeshire Marine SAC against the COs for this feature is provided in Table 7.5.

**Table 7.5: Summary of in combination effects on qualifying grey seal species of the Pembrokeshire Marine SAC COs**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The population is maintaining itself on a long-term basis as a viable component of its natural habitat. | Underwater noise emissions | Underwater noise emissions could increase for short periods during the construction phase of the propsoed development should there be a temporal overlap from other projects during this period. No injury is predicted although some disturbance effects may be observed. Given the low numbers of grey seal within the vicinity of the proposed project and other planned projects the population will not be affected and will remain a viable component of its natural habitat. | No potential for an adverse effect to achieving the conservation objective |
| There is no significant disturbance of the species. | Underwater noise emissions | Any disturbance to individuals that are exposed to anthropogenic noise from identified projects will be relatively minor and short term ensuring no significant disturbance of this feature. | No potential for an adverse effect to achieving the conservation objective |
| The supporting habitats and processes relevant to grey seal and their prey are maintained. | Underwater noise emissions | Habitat associated with grey seal will not affected by underwater noise emissions as there is no identified pathway associated with this impact. | No potential for an adverse effect to achieving the conservation objective |

### 7.9.4 Migratory Fish associated with Pembrokeshire Marine SAC and Cleddau Rivers SAC

7.9.4.1 Activities associated with identified projects for cumulative assessment may cause an increase in underwater noise from a range of sources including construction vessels and plant, barges, dredge vessels. The underwater noise emissions associated with the proposed development activities will be from vessels and operation of dredge plant and equipment.

7.9.4.2 Cumulative underwater noise may cause some avoidance migratory fish species (sea lamprey, river lamprey, allis shad and twaite shad) in the short term. However, no injury or long-term effects are predicted as individuals present within the area are highly mobile and will move to quieter areas once noise is detected. The cumulative disturbance area and/or the period in which disturbance effects are observed may be higher/larger, however recovery rate is likely to be high and any disturbance is not likely to lead to a barrier to migration through the MHW.

7.9.4.3 An assessment of the in-combination effects associated with featured migratory fish species of the Pembrokeshire Marine SAC and Cleddau Rivers SAC against the COs for these features are provided in Table 7.6 and Table 7.7 respectively.

**Table 7.6: Summary of in combination effects on qualifying migratory fish species of the Pembrokeshire Marine SAC COs**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The population is maintaining itself on a long-term basis as a viable component of its natural habitat. | Underwater noise emissions | Underwater noise emissions could increase for short periods during the construction phase of the proposed development should there be a temporal overlap from other projects during this period. However, no injury or long-term population effects are predicted as any animals present within the area are likely to demonstrate some degree of habituation due to already raised levels of underwater noise from existing port and industrial operations. The in combination disturbance area and/or the period in which disturbance effects are observed may be higher/larger, however recovery rate is likely to be high. Based on this assumption migratory fish populations will remain stable and viable component of associated habitats. | No potential for an adverse effect to achieving the conservation objective |
| 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. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. | Underwater noise emissions | Suitable habitat associated with migratory fish species will not be affected by underwater noise emissions and the natural range of the relevant Annex II migratory fish species will not be affected by short term and temporary underwater noise effects from the proposed development or other projects considered in-combination with it. | No potential for an adverse effect to achieving the conservation objective |
| 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. | Underwater noise emissions | Habitat associated with migratory fish species will not affected by underwater noise emissions as there is no identified pathway associated with this impact. | No potential for an adverse effect to achieving the conservation objective |

**Table 7.7: Summary of in combination effects on qualifying migratory fish species of the Cleddau Rivers SAC COs**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The population of the feature in the SAC must be stable or increasing over the long term. | Underwater noise emissions | Underwater noise emissions could increase for short periods during the construction phase of the proposed development should there be a temporal overlap from other projects during this period. However, no injury or long-term population effects are predicted as any animals present within the area are likely to demonstrate some degree of habituation due to already raised levels of underwater noise from existing port and industrial operations. The in combination disturbance area and/or the period in which disturbance effects are observed may be higher/larger, however recovery rate is likely to be high. Based on this assumption migratory fish populations will remain stable and viable component of associated habitats.. | No potential for an adverse effect to achieving the conservation objective |
| The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. | Underwater noise emissions | Suitable habitat associated with migratory fish species will not be affected by underwater noise emissions and the natural range of the relevant Annex II migratory fish species will not be affected by short term and temporary underwater noise effects from the proposed development or other projects considered in-combination with it. | No potential for an adverse effect to achieving the conservation objective |
| Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs. | Underwater noise emissions | Passage of migratory fish species through the Cleddau Rivers SAC will not affected by underwater noise emissions as there is no identified pathway associated with this impact. Underwater noise emissions associated with the proposed development and other projects considered in-combination will also not hinder passage through the MHW to the Cleddau Rivers SAC. | No potential for an adverse effect to achieving the conservation objective |
| 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. | Underwater noise emissions | Characteristic channel morphology will not affected by underwater noise emissions as there is no identified pathway associated with this impact. | No potential for an adverse effect to achieving the conservation objective |

### 7.9.5 Otter associated with Pembrokeshire Marine SAC

7.9.5.1 Activities associated with the identified projects for cumulative assessment may cause an increase noise (both underwater and airborne noise in terrestrial habitats adjoining the foreshore) from a range of sources including construction vessels and plant, barges, dredge vessels. The project will be specifically associated with noise generated from activities associated with dredging plant and equipment.

7.9.5.2 The cumulative underwater noise from projects in combination may modify the dispersal routes of prey species (e.g. fish species) with the potential short-term avoidance of areas affected during the construction.

7.9.5.3 Both the otter and the prey species are highly mobile. Otter will follow the prey species as they hunt and feed. The number/abundance of prey would not change as a result of in-combination effects and otter are expected to quickly adapt to changes in distribution. Otter may also naturally avoid higher levels of noise when they are being generated during construction.

7.9.5.4 The cumulative disturbance area and/or the period in which disturbance effects are observed may be higher/larger as a result of multiple coastal developments, but the areas affected by the proposed development constitute a very small percentage of the available habitat. The dock frontage which will be subject to development is low value habitat for otter, lacking a natural foreshore, with no access to freshwater, and frequent Port operations.

7.9.5.5 An assessment of the potential in-combination effects associated with the otter population in the Pembrokeshire Marine SAC against the COs for its features are provided in Table 7.8.

**Table 7.8: Summary of in combination effects on qualifying otter of the Pembrokeshire Marine SAC COs.**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The otter population is maintaining itself on a long-term basis as a viable component of its natural habitat; | Noise/ lighting /human activty | The noise levels will increase for short periods during the construction phase of the proposed development.<br>Should there be a temporal overlap from other projects during this period there could be multiple points of elevated noise. Overlapping noise generating activities on different developments could increase concurrent affects. Where these periods overlap with the main periods of otter activity (most frequently early morning and dusk) there could be several localised areas where individual otters could adapt dispersal routes.<br><br>Given the wide distribution of the population and the absence of preferred feeding habitats at the site, the dock redevelopment would not affect the ability of individuals to feed or disperse through the SAC. The proposed project, when assessed alongside other planned projects, will not affect the otter population which will remain a viable component of its natural habitat. | No potential for an adverse effect to achieving the conservation objective |
| 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 | Noise /lighting/ human activty | The otter population is widely distributed, and individuals,at least occasionally, visit the dock. Across the SAC the main areas of activity are asscoiated with the coastal foreshore where freshwater watercourses flow into the SAC. There are no areas of preferred feeding habitat associated with Pembroke Port and the redevelopment when considered in combination with other planned developments will not affect the ability of individuals to feed or disperse through the SAC. Consequently there would be no reduction in their natural range as a result potential incombination effects. | No potential for an adverse effect to achieving the conservation objective |
| The presence, abundance, condition and diversity of habitats and species required to support otter is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. | Noise/ lighting /human activty | The proposed development will result in changes to man made structures on the frontage of the dock (slipways). They will be a minor change to the dock habitats with the conversion of two existing slipways into a single large slipway with the lower section extending 40m beyond the dock wall in areas that are subject to periodic dredging. The modification will not adversely affect the condition of foreshore habitats of value to otter or the abundance of prey species. | No potential for an adverse effect to achieving the conservation objective |

### 7.9.6 Harbour Porpoise associated with West Wales Marine cSAC

7.9.6.1 Harbour porpoise are occasionally sighted in the MHW within the vicinity of Pembroke Port. Minor disturbance effects such as avoidance and masking of communication are predicted for the proposed development activities from piling, vessel movements and dredging with the overall impact considered not to be significant. Similar effects may also arise due to vessel and dredge activities from all four in-combination effects projects identified. Potential effects may extend for a longer duration and a larger area if a temporal overlap is assumed.

7.9.6.2 An assessment of the in-combination effects associated with the harbour porpoise feature of the West Wales Marine SAC against the COs for its features are provided in Table 7.9.

**Table 7.9: Summary of in combination effects on qualifying harbour porpoise of the West Wales Marine SAC COs**

| Conservation Objectives | Potential Effects | Assessment Summary on Conservation Objective | Conclusion |
|---|---|---|---|
| The population is maintaining itself on a long-term basis as a viable component of its natural habitat | Underwater noise emissions | Underwater noise emissions could increase for short periods during the construction phase of the proposed development should there be a temporal overlap from other projects during this period. No injury is predicted although some behavioural effects may be observed. Given the low numbers of harbour porpoise within the vicinity of the proposed project and other planned projects and the short term, temporary nature of the construction works, the population will not be affected and will remain a viable component of its natural habitat. | No potential for an adverse effect to achieving the conservation objective |
| There is no significant disturbance of the species. | Underwater noise emissions | Any disturbance to individuals that are exposed to anthropogenic noise from identified projects will be relatively minor and short term ensuring no significant disturbance of this feature. | No potential for an adverse effect to achieving the conservation objective |
| The supporting habitats and processes relevant to harbour porpoises and their prey are maintained. | Underwater noise emissions | Habitat associated with harbour porpoise will not be affected by underwater noise emissions from the propsoed development as there is no identified pathway associated with this impact. | No potential for an adverse effect to achieving the conservation objective |

# 8 EFFECTS ON SITE INTEGRITY

## 8.1 Pembrokeshire Marine/ Sir Benfro Forol SAC

8.1.1.1 Based on the information presented in Section 7, no adverse effect on the integrity of the Pembrokeshire Marine SAC, with specific regard to the benthic habitats, migratory fish (sea lamprey, river lamprey, allis shad and twaite shad), otter and grey seal populations, is predicted as a result of the proposed development, either alone or in-combination with other plans and projects.

## 8.2 West Wales Marine / Gorllewin Cymru Forol cSAC

8.2.1.1 Based on the information presented in Section 7, no adverse effect on the integrity of the West Wales Marine cSAC, with specific regard to the harbour porpoise populations, is predicted as a result of the proposed development, either alone or in-combination with other plans and projects.

## 8.3 Cleddau Rivers/ Afonydd Cleddau SAC

8.3.1.1 Based on the information presented in Section 7, no adverse effect on the integrity of the Cleddau Rivers SAC, with specific regard to the migratory fish populations (sea lamprey and river lamprey) is predicted as a result of the proposed development, either alone or in-combination with other plans and projects.

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