MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Environmental Mitigation & Monitoring Plan

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Marine Energy Test Area
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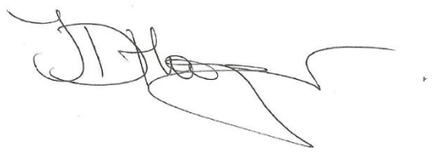
Jessica Hooper  2019-12-05

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Acronyms

Acronym	Description
CIC	Community Interest Company
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMMP	Environmental Mitigation and Monitoring Plan
IMO	International Maritime Organisation
INNSMP	Invasive Non-Native Species Management Plan
JNCC	Joint Nature Conservation Committee
MEECE	Marine Energy Engineering Centre of Excellence
META	Marine Energy Test Areas
MEW	Marine Energy Wales
MHPA	Milford Haven Port Authority
ML	Marine Licence
MPCP	Marine Pollution Contingency Plan
MWL	Marine Works Licence
NRW	Natural Resources Wales
PCC	Pembrokeshire County Council
PCF	Pembrokeshire Coastal Forum
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
VER	Valued Ecological Receptor

Units

Unit	Description
Km	kilometre
m	metre
m/s	metre per second

1. INTRODUCTION

1.1 Purpose

1.1.1.1 This Environmental Mitigation and Monitoring Plan (EMMP) has been prepared by RPS on behalf of Marine Energy Wales (MEW), a Pembrokeshire Coastal Forum (PCF) Community Interest Company (CIC) led project (the Applicant) to support licence/consent applications for the Marine Energy Test Area (META) project. MEW recognises that due to the emerging nature of the wave and tidal energy industries, there is uncertainty about some potential impacts of the installation, operation and maintenance, and decommissioning of marine energy projects, especially where potential impacts have yet to be verified by operational monitoring. The purpose of this EMMP is to provide an outline of the post-consent approach to mitigation, survey and monitoring at the META project (Phase 2 sites – Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8) proportional to the assessment of significance set out in the topic-specific technical assessments in chapters 5 – 16 of the META Environmental Statement. Where strategic survey/monitoring is deemed appropriate to inform wider marine energy industry research gaps, MEW would look to a collaborative effort between the META project, wider industry (including Marine Energy Engineering Centre of Excellence (MEECE) and Pembroke Dock Marine (PDM)), academia, regulators and stakeholders to take this forward in the most efficient way for the interest of the META project and future marine energy projects elsewhere in Wales and the UK,

1.1.1.2 The EMMP has been prepared at the pre-application stage and is based upon the conclusions and recommendations presented for each technical assessment presented in the Environmental Statement for the META project, and following pre-application consultation with key stakeholders. The EMMP is a live document and will be revised as required, and agreed, further to consultation with the regulatory authorities and their statutory advisors.

1.2 Scope of the EMMP

1.2.1.1 The information set-out in this EMMP will cover the following:

- Mitigation, where a potential impact may lead to a significant effect on a sensitive receptor;
- Pre-installation baseline survey (an enhanced, pre-installation survey to further describe the baseline where this is deemed necessary);
- Device-specific survey (detailed information on device-specific deployments locations, for example micro-siting of devices); and
- Monitoring (monitoring of any effects that may arise due to the activities proposed at the META project sites).

1.2.1.2 Detail on each of these approaches is set out below:

1.2.2 Mitigation

1.2.2.1 Mitigation has been proposed where a potential impact may lead to a significant effect on a sensitive receptor, as identified in the Environmental Impact Assessment (EIA) for the META project or where there is low confidence in an assessment due to a paucity of data. In addition, best practice mitigation and management measures have been proposed.

1.2.3 Pre-installation baseline survey

1.2.3.1 Surveys have been proposed in respect of providing an updated pre-installation baseline where this is deemed necessary. The focus of the pre-installation baseline surveys will be to gather information on those receptors where there was either insufficient information to conclude with certainty that a significant impact could occur, or where a potentially significant effect was identified for a receptor and further information is required to provide a current baseline against which change can be monitored.

1.2.4 Device-specific survey

1.2.4.1 Surveys may also be required to obtain detailed information on proposed device-specific deployment locations within each of the META test sites. This may include surveys to determine potential environmental sensitivities at a device-specific deployment location, which would subsequently inform the approach to deployment and provide information to inform the micro-siting of devices. If required, these will be undertaken during the pre-deployment phase associated with specific device-deployments and will highlight where there may be a need for further mitigation (e.g. micro-siting of devices to avoid Annex I habitat).

1.2.5 Monitoring (monitoring of any effects that may arise due to the activities proposed at the META project sites)

1.2.5.1 Further to any pre-construction baseline surveys deemed necessary, and the assessment of impact presented within the Environmental Statement, there may be a need for monitoring of potential effects that may arise due to the activities at the META sites (thereby validating the predictions in the EIA).

1.3 Project background

1.3.1.1 The proposed META project, developed by MEW on behalf of PCF, aims to provide a suite of offshore marine energy test sites to facilitate the testing and development of marine energy projects. The META project will provide marine renewable energy device developers with pre-consented testing sites, which will reduce the consenting burden on these developers. The aim of the META project is therefore to provide a series of pre-consented, non-grid connected, marine energy test areas that will allow for the deployment and testing of devices, components and subassemblies, and ancillary activities and equipment, in support of marine energy testing. Thereby de-risking marine energy projects prior to larger scale or array deployments.

1.3.1.1 The META project is located in the inshore waters of Pembrokeshire and forms part of Pembroke Dock Marine, a £76 million project to develop a world class centre for marine energy development, fabrication, testing and deployment, in Pembrokeshire. It is one of 11 projects included in the Swansea Bay City Deal signed in 2017. The four pillars of the Pembrokeshire Dock Marine Project include:

- The META Project (being developed under MEW);
- Marine Energy Engineering Centre of Excellence (MEECE) (an Offshore Renewable Energy Catapult project);
- Pembroke Port managed and operated by Milford Haven Port Authority (MHPA); and
- Pembrokeshire Demonstration Zone (PDZ) (being developed by WaveHub).

1.3.1.2 The META Phase 2 project incorporates Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8). These are henceforth called 'the META project'. Warrior Way (site 6) and Dale Roads (site 7) are located within the Milford Haven Waterway (subsequently referred to as the Waterway), and East Pickard Bay (site 8) is located on the south-eastern boundary of the Waterway, 500 m west of Mean High Water Springs (MHWS) to the North of Freshwater West Bay. The site locations are shown in Figure 1.1.

1.3.1.3 MEW has prepared an Environmental Statement in accordance with the EIA Regulations in order to present an assessment of the potential impacts of the installation, operation and decommissioning at the META project on the marine environment.

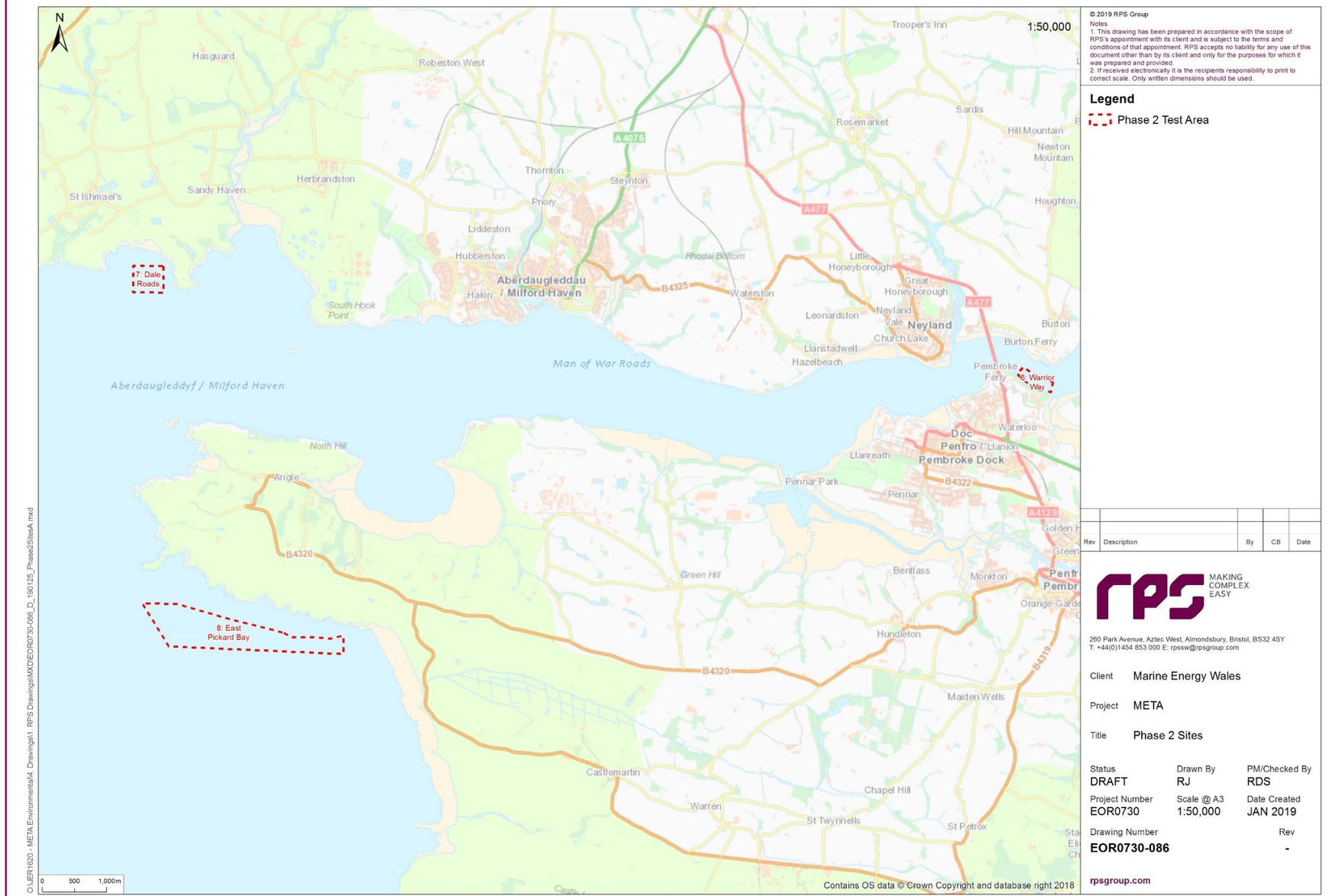
1.3.1.4 The following regulations are referred to in this report and in the Environmental Statement as the 'EIA Regulations':

- The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 as amended by SI 2019/292 - The Electricity Works (Environmental Impact Assessment) (England and Wales) (Amendment) (Wales) Regulations 2019;
- The Town and Country Planning (EIA) (Wales) Regulations 2017; and
- The Marine Works (Environmental Impact Assessment Regulations 2017 (the Marine Works Regulations).

1.3.1.5 The Environmental Statement has been submitted for approval to the following regulatory authorities on 10 June 2019.

- Natural Resources Wales (NRW) – Permitting Services;
- Pembrokeshire County Council (PCC); and
- Milford Haven Port Authority (MHPA).

1.3.1.6 This EMMP has been informed by the findings and recommendations presented in the topic chapters within the Environmental Statement and is submitted as a draft with other META plans (see Environmental Management Plan (EMP)), with the META Environmental Statement.



Notes
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Legend

Phase 2 Test Area

Rev	Description	By	CB	Date

260 Park Avenue, Aztec West, Almondsbury, Bristol, BS32 4SY
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Client: Marine Energy Wales

Project: META

Title: Phase 2 Sites

Status	Drawn By	PM/Checked By
DRAFT	RJ	RDS
Project Number	**Scale @ A3**	**Date Created**
EOR0730	1:50,000	JAN 2019

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Figure 1.1: The META project site locations

1.3.2 Project milestones

1.3.2.1 Table 1.1 summarises the timeline for the META project, highlighting when first deployments are planned.

Table 1.1 Project milestones for META

Milestone	Anticipated programme
EIA submission	June 2019
Consent awarded	March 2020
First deployments	April 2020

1.4 Consultation

1.4.1.1 Table 1.2 summarises the consultation undertaken to date in regard to mitigation, survey and monitoring in relation to the META project.

Table 1.2 Consultations in relation to mitigation, survey and monitoring at the META sites

Date	Consultee and type of consultation	Issue discussed	Where addressed in this EMMP
28 April 2019	NRW/MMO - Scoping Opinion	In order to determine the most suitable location within the wider test site, appropriate characterisation of the baseline environment is required in the EIA/ Environmental Statement. We recommend that multi-beam bathymetric surveys be conducted for each of the test sites, if suitable data is not available. This will allow identification of the broader habitats and help target areas where ground truthing (using drop down video or similar) can be used. The chosen area should present low sensitivities to the various impacts from the project as well as high resilience to habitat disturbance and temporary loss. We anticipate that by identifying smaller seabed deployment zones in the wider area that it would limit the amount of impact to the sensitive Annex 1 habitats in the Milford Haven Waterway.	Bathymetric data is available for all three META sites and is presented in Appendix 7.1: Multibeam Backscatter Data of chapter 7: Benthic Subtidal and Intertidal Ecology. This data has been examined and amendments to the site boundaries at Warrior Way (site 6) and East Pickard Bay (site 8) have been made to avoid areas of sensitive habitat. Pre-deployment surveys by device developers at Warrior Way (site 6) and Dale Roads (site 7) are proposed, if required, to inform micro-siting of test devices at these sites, in order to identify and avoid direct impacts to sensitive reef habitats (section 7.2.2)..
28 April 2019	NRW/MMO - Scoping Opinion	The Environmental Statement must include: • A description of measures to avoid, prevent, reduce or offset identified significant adverse effects, and proposed monitoring arrangements.	Each technical chapter (chapters 5-16) describes the measures taken to avoid, prevent, reduce or offset identified significant adverse effects and outlines any proposed monitoring. This EMMP describes in more detail the mitigation, survey and monitoring proposed as part of the META project (sections 4 to 0).
28 April 2019	NRW/MMO - Scoping Opinion	The description of the physical baseline environment within the three test areas is quite limited at present, as is the information on the future survey works proposed. More detailed information describing the baseline environment must be presented in the Environmental Statement, informed by site-specific monitoring.	Detailed information describing the baseline environment pertinent to each technical assessment is presented in each technical chapter (chapters 5-16). Where appropriate further mitigation, survey and monitoring proposed has been outlined within this EMMP (sections 4 to 0).
28 April 2019	NRW/MMO - Scoping Opinion	Benthic surveys should be undertaken in accordance with the following guidelines: • Saunders, G., Bedford, G.S., Trendall, J.R., and Sotheran, I. (2011). Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 5. Benthic Habitats. Unpublished draft report to Scottish Natural Heritage and Marine Scotland; • Hitchin, R., Turner, J.A., Verling, E. (2015) Epibiota remote monitoring from digital imagery: Operational guidelines.	The pre-deployment benthic surveys outlined in chapter 7: Benthic Subtidal and Intertidal Ecology will be undertaken in line with all relevant guidance including Saunders *et al* (2011), and Hitchin *et al* (2015). Section 7 of this EMMP provides further information on mitigation, surveys and monitoring proposed in relation to benthic ecology.
28 April 2019	NRW/MMO - Scoping Opinion	Based on the location of East Pickford Bay detailed within the Scoping Report dated 16 November 2018 we consider that the location of the East Pickard Bay test area should be amended. This is because it currently covers a large area that includes both circalittoral rock and mobile sand. In order to minimise the direct impact on designated (SAC) reef feature, which includes all circalittoral rock in the area, it would be beneficial to move the East Pickard Bay site to the South slightly to cover only areas of mobile sand substrate. This should be easily identified in the multibeam bathymetry as the boundary between rock and sand will be clear. The subtidal sand substrate in Freshwater West bay is not part of the subtidal sandbank SAC feature. It is unclear if these are the changes that have been proposed within the 'Evidence Report' however if these changes are made then we consider that further surveys of East Pickard Bay would not be required, because mobile sand is resilient to habitat disturbance and temporary loss of habitat; there would likely be a quick recovery of the habitats affected; and the habitat is not part of a SAC feature.	The East Pickard Bay site (site 8) has been refined following consultation with NRW to overlap only with areas of mobile sand substrate. Following these amendments and NRW advice stated, no further surveys of East Pickard Bay (site 8) are therefore proposed.
28 April 2019	NRW/MMO - Scoping Opinion	Research and monitoring carried out on other marine renewable energy developments should be reviewed and utilised in the assessments where appropriate. This may identify potential impact pathways which have not yet been identified.	Impacts assessed within the technical chapters are consistent with potential impacts identified in the report for Scottish Government on Consenting, EIA and HRA Guidance for Marine Renewable Energy Developments in Scotland (EMEC and Xodus, 2010). Review of research and monitoring carried out at other marine renewable energy projects including the European Marine Energy Centre (EMEC), Strangford Lough – Marine Current Turbines (MCT) project, Ramsey Sound – Tidal Energy project, and the Inner Sound – MeyGen project has been undertaken in order to inform impacts taken forwards for assessment.
15 January 2019	NRW advisory services – Scoping consultation response	No data collection is required if the data sources listed (provided in chapter 9: Marine Mammals, Basking Sharks and Otter) are taken into consideration.	These data sources have been considered within chapter 9: Marine Mammals, Basking Shark and Otters, therefore no further data collection is proposed.

Date	Consultee and type of consultation	Issue discussed	Where addressed in this EMMP
28 April 2019	NRW/MMO - Scoping Opinion	It is noted that 1 year of site-specific ornithology surveys are planned to be undertaken. The nature of the surveys proposed are not clear, but we anticipate that one year of surveys should be sufficient to inform the EIA. It should be noted that further operational surveys may be required in future if deemed appropriate following review of the survey data and additional information.	Further consultation via the NRW Discretionary Advice Service has been sought and clarify mis-apprehension that 1 year of marine ornithology surveys were proposed. Section 4 summarises proposed marine ornithology mitigation, surveys and monitoring.
28 April 2019	NRW/MMO - Scoping Opinion	The EIA must identify the extent of the offshore test sites and provide a defined site boundary and appropriate buffer as a basis for undertaking baseline surveys.	Comment has been noted. Should surveys be required following the NRW Discretionary Advice Service consultation this will be considered. Additionally, see section 4 for further information on mitigation, baseline surveys and monitoring.
28 April 2019	NRW/MMO - Scoping Opinion	Owing to the distance of the test sites (including the application buffers) from the shore, boat-based or aerial surveys may be required, in accordance with Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume 4: Birds (Scottish Natural Heritage, 2011).	Comment has been noted. Should surveys be required following the NRW Discretionary Advice Service consultation, this will be considered. Additionally, see section 4 for further information on mitigation, baseline surveys and monitoring.
28 April 2019	NRW/MMO - Scoping Opinion	To assess the potential impacts of the scheme on ornithology the surveys must take account of all the ancillary components of the project. These may include the cable landfall, access tracks, control station, construction compounds, or other structures required by the scheme.	All appropriate works and ancillary equipment have been considered within Chapter 10: Marine Ornithology.
28 April 2019	NRW/MMO - Scoping Opinion	In addition to bird surveys, a desk study should be completed. On the whole, the data sources proposed to be used appear reasonable. The following data sources should be considered in the EIA: • Historical at sea surveys for birds such as the ESAS and WWT combined seabird data for Welsh waters; • BirdTrack data; • Bird data from the Pembrokeshire county recorder; • Terrestrial bird data for the general vicinity, including chough data is available from the RSPB.	Detailed information describing the marine ornithology baseline environment is presented in chapter 10: Marine Ornithology, including the data sources provided by NRW. Additionally, see section 4 for further information on mitigation, baseline surveys and monitoring.
28 April 2019	NRW/MMO - Scoping Opinion	MGN 543 Annex 2 requires that hydrographic surveys fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager and the UK Hydrographic Office. Failure to report the survey or conduct it to Order 1a might invalidate the Navigational Risk Assessment if it was deemed not fit for purpose.	The NRA is presented within Appendix 12.1: Navigational Risk Assessment (NRA). Due to the relatively small spatial extent of the META project sites and as these sites fall predominantly within the MHPA jurisdiction, consultation was carried out with MCA who confirmed that radar and visual observations were not required and that AIS data could be relied upon, providing wide consultation could be demonstrated. This is considered proportionate to the scale of the works and no further surveys are proposed.
10 January 2019	NRW advisory – discretionary advice service.	Regulation 37 package for the Pembrokeshire Marine Special Area of Conservation (SAC) should be used to provide further clarification on the ecology and designations of the SAC as well as the Conservation Objectives for the habitat features.	The Regulation 37 package has been used to inform the benthic subtidal and intertidal ecology characterisation presented in Chapter 7: benthic subtidal and intertidal ecology (section 7.7) and will also be used in the Report to Inform Appropriate Assessment (RIAA) for the project.
		The East Pickard Bay site (site 8) boundary should be revised to avoid the designated reef feature and instead focus the area on sand substrate only.	On the basis of NRW's advice, the boundary of the East Pickard Bay test area (site 8) has been revised to avoid the designated reef feature at this location. The East Pickard Bay test area (site 8) therefore only covers the sand substrate at this location.
		Drop-down camera surveys are proposed for the cable route which we consider will be sufficient for micro siting of the cable lay.	Since the submission of the Scoping Report, the PDE has changed such that there is no longer a marine cable at East Pickard Bay (site 8).
19 January 2019	Pembrokeshire County Council (PCC)	A main concern relates to the lack of marine and terrestrial surveys undertaken to support the proposals and that further surveys are not being proposed. No seabed, drop down, or marine surveys have been undertaken of the three marine test sites (Phase 2) and no ecological walkovers have been completed for the terrestrial elements. Without knowing what species and habitats are present within the sites it is not possible to undertake any kind of impact assessment.	As no onshore works are within the scope of the META project, no onshore surveys are proposed. Multibeam backscatter surveys of all three test sites, undertaken by SEACAMs, have been presented in in Appendix 7.1: Multibeam Backscatter Data of chapter 7: Benthic Subtidal and Intertidal Ecology. This data has been examined and amendments to the site boundaries at Warrior Way (site 6) and East Pickard Bay (site 8) have been made to avoid areas of potentially sensitive habitat. Pre-deployment surveys by device developers at Warrior Way (site 6) and Dale Roads (site 7) are proposed, if required, to inform micro-siting of test devices at these sites, in order to identify and avoid direct impacts to sensitive reef habitats (section 7.2.2). In the first instance, these surveys will comprise a comprehensive review and interpretation of the geophysical survey data available for these sites (as presented in Appendix 7.1: Multibeam Backscatter Data) by a suitably qualified and experienced marine ecologist / geophysicist, to identify any areas of potential reef features or sensitive habitat features that may be present. In the event that acoustic signatures synonymous with potential reef presence for example, are identified from the geophysical data, it is proposed that these would be subject to further ground-truthing via a pre-deployment survey, the exact format of which would be agreed with NRW at the time. The pre-deployment survey, if required, would likely utilise remote sampling techniques (e.g. drop-down video) to

Date	Consultee and type of consultation	Issue discussed	Where addressed in this EMMP
			establish the presence or absence of any reef features, and where present to determine their extent. These surveys will ensure that measures can be designed, if necessary, (e.g. micrositing of moorings etc.) to avoid direct impacts to sensitive habitats such as reefs and seagrass at these sites (section 7.2.2).
19 January 2019	PCC	As above there is insufficient survey work to assess what habitats, species and features are present and thus identify what the potential cumulative impacts are. Further surveys and assessments are required to identify cumulative impacts.	Detailed information describing the baseline environment pertinent to each technical assessment is presented in each technical chapter (chapters 5-16). Where appropriate, further mitigation, survey and monitoring proposed has been outlined within this EMMP (sections 4 to 0).
19 January 2019	PCC	As above there is insufficient survey work to assess what habitats, species and features are present and thus identify transboundary impacts. Further surveys and assessments are required to identify transboundary impacts.	Detailed information describing the baseline environment pertinent to each technical assessment is presented in each technical chapter (chapters 5-16). Where appropriate, further mitigation, survey and monitoring proposed has been outlined within this EMMP (sections 4 to 0).
19 January 2019	RSPB	Overall, we consider that the scoping document is generally comprehensive although it lacks detail in terms of ornithological issues. There are some matters that we consider need further attention, through providing a detailed programme of ornithological surveys.... We recommend at least 2 years of bird survey effort, covering all seasons and including both breeding and non-breeding populations. In addition to bird surveys, a desk study should be completed (see above link for FAME and STAR data). We recommend sourcing bird data from the Pembrokeshire county recorder (https://birdsin.wales/counties/pembroke/).	Detailed information describing the baseline environment and the data sources utilised pertinent to the marine ornithology technical assessment is presented in chapters 10: Marine Ornithology. Where appropriate, further mitigation, survey and monitoring proposed has been outlined within this EMMP (section 4). Further consultation via the NRW Discretionary Advice Service has been sought regarding marine ornithology surveys.
19 January 2019	RSPB	It will be important to identify the extent of the offshore test sites and provide a defined site boundary and appropriate buffer as a basis for undertaking baseline surveys.	This comment is noted and should bird surveys be required following further consultation with NRW-PS, this advice will be considered.
19 January 2019	RSPB	Owing to the distance of the test sites (including the application buffers) from the shore, boat-based or aerial surveys may be required, in accordance with Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume 4: Birds (Scottish Natural Heritage, 2011).	This comment is noted and should bird surveys be required following further consultation with NRW-PS, this advice will be considered.
19 January 2019	RSPB	The potential impact of the scheme cannot be assessed unless surveys take account of all its ancillary components. These may include the cable landfall, access tracks, electrical connections (overhead lines or buried cables), construction compounds, sub-stations or other structures required by the scheme.	As no onshore or intertidal works are within the scope of the META project, no onshore or intertidal surveys are proposed.
19 January 2019	Welsh Government	The scoping report has also identified that the proposed works could have an impact on undesignated heritage assets and proposes to assess the impact on these in a desk-based assessment carried out in accordance with the standards and guidance set by the Chartered Institute for Archaeologists. This would be an appropriate first stage of assessment for these assets, but further assessment may be required, including geophysical surveys and archaeological evaluation, in order to fully assess any impact on undesignated heritage assets.	Chapter 13: Marine Archaeology outlines the proposed approach to any marine archaeological verification of pre-deployment surveys. Section 8 of this EMMP further details the proposed approach.
09 July 2019	RSPB Consultation	The preferred deployment period (Warrior Way - site 6) should be to coincide with the little grebe breeding season (March to July inclusive) and deployment outside of this period would require two months of pre-deployment grebe surveys (minimum four observations).	Preferred deployment period has been updated, and requirement for two-month pre-deployment survey for little grebe has been reflected in Table 2.1 and Table 4.2.
09 July 2019	RSPB Consultation	There is a potential need for pre/post deployment monitoring of devices at East Pickard Bay that exceed a given size threshold. The threshold is to be agreed between NRW and the Applicant	Addressed in Table 2.3 and Table 4.2

1.5 Context

1.5.1.1 The EMMP is informed by the conclusions of the Environmental Impact Assessment (EIA) process, as set-out in the META Environmental Statement, and by the recommendations for mitigation and/or monitoring presented in each of the technical assessments presented within the META Environmental Statement. The requirement for mitigation and monitoring has been subject to discussion and agreement with the statutory consultees as outlined in Section 1.3.

1.5.2 Legislative/legal context

1.5.2.1 MEW is seeking a Marine Licence under the Marine and Coastal Act 2009, a Marine Works Licence (MWL), and Town and Country Planning Permission for Warrior Way (site 6) as summarised in Table 1.3.

Table 1.3: The META project consenting and licensing requirements.

Site Number	META site	Consent Requirements			
		Marine Works Licence	Marine Licence	Crown Estate Lease/ SWL	Town and Country Planning
6	Warrior Way	Y	Y (3)	Lease	Y (PCC)
7	Dale Roads	Y	Y (3)	Lease	N
8	East Pickard Bay	Y	Y (3)	Lease	N

1.5.2.2 The measures adopted as part of the project will be implemented via issue-specific plans/assessments: META Environmental management Plan (EMP), Annexes 4.1 to 4.9

1.6 Document structure

1.6.1.1 Table 1.4 outlines the structure of the EMMP, and Table 2.1, Table 2.2 and Table 2.3 (section 2) summarise the mitigation, survey and monitoring requirements for each META project site in the order Warrior Way (site 6), Dale roads (site 7), and East Pickard Bay (site 8).

1.6.1.2 Each technical section (sections 4 to 0) sets out the mitigation, survey and monitoring requirements required for each topic as set out in Table 1.4, and is set-out under the headings detailed in section 1.2 as follows:

- Mitigation
- Pre-installation baseline survey
- Device-specific survey
- Monitoring

Table 1.4: EMMP document structure

Section	Title	Overview
1	Introduction	Purpose of the EMMP including overview of the context and any consultations undertaken to date.
2	Summary by Site	Summary of mitigation, monitoring and survey requirement at each META project site.
3	Management, implementation and Communication	Roles and responsibilities for carrying out the EMMP, communication/reporting and change management procedure.
4	Marine ornithology	Summary of mitigation, monitoring and survey requirement for marine ornithology receptors
5	Marine mammals, basking shark and otter	Summary of mitigation, monitoring and survey requirement for marine mammal and otter receptors
6	Fish and shellfish	Summary of mitigation, monitoring and survey requirement for fish and shellfish receptors.
7	Benthic subtidal and intertidal ecology	Summary of mitigation, monitoring and survey requirement for benthic subtidal and intertidal receptors
8	Marine archaeology	Summary of mitigation, monitoring and survey requirement for marine archaeology receptors
9	Coastal processes	Summary of mitigation, monitoring and survey requirement for coastal processes receptors
Appendix A	Coastal bird survey plan	Detailed survey plan for undertaking coastal bird surveys
Appendix B	Otter survey plan	Detailed survey and monitoring plan for undertaking otter surveys

2. SUMMARY BY SITE

2.1 Warrior Way (site 6)

2.1.1.1 Table 2.1 summarises the mitigation, survey and monitoring requirements at Warrior Way (site 6).

Table 2.1 Summary of mitigation, survey and/or monitoring required at Warrior Way (site 6).

Receptor	Mitigation/ survey /monitoring	Description	Cross-reference in this EMMP/ other consent plans
Ornithology			
All birds	Mitigation	Best practice measures to reduce disturbance from vessels and to reduce the potential for pollution incidents.	Section 4.2.2

Receptor	Mitigation/ survey /monitoring	Description	Cross-reference in this EMMP/ other consent plans
All birds	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 4.2.1
Diving birds	Mitigation	A minimum distance of 2 m will be maintained between the tip of operational turbine blades and the sea surface.	Section 4.2
Little grebe	Survey	Preferred period of deployment and operation at Warrior Way (site 6) will be little grebe breeding season (March to July inclusive). If deployment of tidal turbines is proposed outside months of March to July, a minimum of two months (minimum of four observations) pre-deployment surveys may be undertaken. Results will be submitted to NRW prior to deployment.	Section 4.3
Marine mammals, basking shark and otter			
All marine mammals, basking shark and otter	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 5.2.1
All marine mammals, basking shark and otter	Mitigation	Best practice measures to reduce disturbance and collision risk from vessels	Section 5.2.2
Otter	Device-specific survey	Walkover surveys to determine species presence and site use to determine whether EPS licence will be required	Section 5.4.1
Otter	Monitoring	Monitoring of the first deployment (installation, operation and decommissioning phases) to determine any change in use due to device deployment	Section 5.5
Fish and shellfish			
All fish and shellfish	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 6.2.1
Benthic subtidal and intertidal ecology			
Benthic habitats and species	Mitigation	Invasive species management plan	Section 7.2.3
Sensitive habitat and species	Mitigation	Micro-siting of devices or components on the seabed	Section 7.2.2
Benthic habitats and species	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 7.2.1
Benthic habitats and species	Device-specific surveys	Pre-deployment survey to determine presence/absence and distribution of sensitive Annex 1 benthic habitats to inform micro-siting of devices or components on the seabed	Section 7.4.1
Marine archaeology			
Archaeological receptors	Mitigation	Micro-siting to avoid impact on marine archaeology receptors	Section 8.2
Archaeological receptors	Device-specific surveys	Archaeologist review of any device specific drop-down video/camera or topographical surveys undertaken for other interests	Section 8.4

2.2 Dale Roads (site 7)

2.2.1.1 Table 2.2 summarises the mitigation, survey and monitoring requirements at Dale Roads (site 7).

Table 2.2 Summary of mitigation, survey and/or monitoring required at Dale Roads (site 7).

Receptor	Mitigation/ survey/ monitoring	Description	Cross-reference in this EMMP/ other consent plans
Ornithology			
All birds	Mitigation	Best practice measures to reduce disturbance from vessels and to reduce the potential for pollution incidents.	Section 4.2.2
All birds	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 4.2.1
Diving birds	Mitigation	Potential for bird ingress to wave devices will be minimised through device design	Section 4.2.2
Marine mammals, basking shark and otter			
All marine mammals, basking shark and otter	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 5.2.1
All marine mammals, basking shark and otter	Mitigation	Best practice measures to reduce disturbance and collision risk from vessels	Section 5.2.2
Fish and shellfish			
All fish and shellfish	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 6.2.1
All fish and shellfish	Mitigation	Device design (wave devices) to minimise potential for fish ingress	Section 6.2
Benthic subtidal and intertidal			
Benthic habitats and species	Mitigation	Invasive species management plan	Section 7.2.3
Sensitive habitat and species	Mitigation	Micro-siting of devices or components on the seabed	Section 7.2.2
Benthic habitats and species	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 7.2.1
Benthic habitats and species	Device-specific surveys	Pre-deployment survey to determine presence/absence and distribution of sensitive Annex 1 benthic habitats to inform micro-siting of devices or components on the seabed	Section 7.4.1
Marine archaeology			
Archaeological receptors	Mitigation	Micro-siting to avoid impact on marine archaeology receptors	Section 8.2

Receptor	Mitigation/ survey/ monitoring	Description	Cross-reference in this EMMP/ other consent plans
Archaeological receptors	Device-specific surveys	Archaeologist review of any device specific drop-down video/camera or topographical surveys undertaken for other interests	Section 8.4
Coastal processes			
Coastal processes receptors	Mitigation	Mitigation for potential scour effects will be determined on a device-specific basis.	Section 9.2
Coastal processes receptors	Device-specific survey	An assessment of scour will be undertaken prior to installation of devices or components on a case by case basis. Detailed foundation design will establish where scour may be an issue and provide mitigation as appropriate.	Section 9.4

2.3 East Pickard Bay (site 8)

2.3.1.1 Table 2.3 summarises the mitigation, survey and monitoring requirements at East Pickard Bay (site 8).

Table 2.3 Summary of mitigation, survey and/or monitoring required at East Pickard Bay (site 8).

Receptor	Mitigation/ survey/ monitoring	Description	Cross-reference in this EMMP/ other consent plans
Ornithology			
All seabirds	Survey and monitoring	Where proposed devices for deployment at East Pickard Bay (site 8) are expected to approach the maximum dimensions scenario (i.e. 147 m x 230 m), or a size to be agreed with NRW, developers may be required to undertake ornithological surveys prior to deployment. Details of survey and/or monitoring to be undertaken will be agreed with NRW on a case-by-case basis.	Section 4.4
All seabirds	Mitigation	Best practice measures to reduce disturbance from vessels and to reduce the potential for pollution incidents.	Section 4.2.2
All seabirds	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 4.2.1
All seabirds	Mitigation	Potential bird ingress to wave devices will be minimised through device design.	Section 4.2.2
Marine mammals, basking shark and otter			
All marine mammals, basking shark and otter	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 5.2.1
All marine mammals, basking shark and otter	Mitigation	Best practice measures to reduce disturbance and collision risk from vessels	Section 5.2.2
Fish and shellfish			
All fish and shellfish	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 6.2.1
Fish	Mitigation	Potential fish ingress to wave devices will be minimised through device design.	Section 6.2
Benthic subtidal and intertidal			
Benthic habitats and species	Mitigation	Invasive species management plan	Section 7.2.3
Benthic habitats and species	Mitigation	Implementation of Marine Pollution Contingency Plan (MPCP) in order to manage the risk of accidental pollution in the marine environment	Section 7.2.1
Marine archaeology			
Archaeological receptors	Mitigation	Micro-siting to avoid impact on marine archaeology receptors	Section 8.2
Archaeological receptors	Device-specific surveys	Archaeologist review of any device specific drop-down video/camera or topographical surveys undertaken for other interests	Section 8.4
Coastal processes			
Coastal processes receptors	Mitigation	Mitigation for potential scour effects will be determined on a device-specific basis.	Section 9.2
Coastal processes receptors	Device-specific survey	An assessment of scour will be undertaken prior to installation of devices or components on a case by case basis. Detailed foundation design will establish where scour may be an issue and provide mitigation as appropriate.	Section 9.4

3. MANAGEMENT

3.1 Roles and Responsibilities

3.1.1 MEW Environmental Management

3.1.1.1 MEW will have overall responsibility for the EMMP and will provide updates to this document in consultation with the relevant statutory consultees, and as required by the regulatory authorities. MEW will ensure that all mitigation and monitoring outlined in this EMMP is undertaken by competent organisations/individuals within the stated timeframes.

3.1.1.2 MEW will review the survey reports and will subsequently ensure that reports to the regulatory authorities, are submitted as required.

3.1.1.3 The MEW Operational Manager (see section 3.1.2) will have responsibility for any remedial action necessary following a report of non-compliance (see section 3.1.2.2).

3.1.2 MEW Operational Manager

3.1.2.1 The MEW Operational Manager will ensure that all mitigation and monitoring undertaken in the field is compliant with the mitigation and monitoring detailed in this EMMP.

3.1.2.2 Where mitigation is to be implemented, the survey contractor will submit a daily progress report (DPR) to the Operational Manager for review. It is the Operational Manager responsibility to check the DPRs and report any deviation from compliance.

3.1.3 Ecological survey contractors

3.1.3.1 The MEW Operational Manager may liaise with statutory stakeholders, industry stakeholders, device developers and academia to ensure that the mitigation and monitoring outlined in this EMMP is implemented. Where specialist contractors are required to undertake mitigation, survey or monitoring, these will be appointed on a case-by-case basis. At this pre-application stage of the project there are no specialist contractors appointed, however this information will be provided when this document is updated post-consent.

3.2 Communication and reporting

3.2.1.1 The MEW Operational Manager will ensure that any communication procedures as set out in the EMP (section 2.2) are followed, and that all reporting on mitigation, survey or monitoring are undertaken in accordance with the communications procedure as set out in the EMP (section 2.2).

4. MARINE ORNITHOLOGY

4.1 Summary of impacts and baseline information

4.1.1.1 Table 4.1 provides a summary of the potential impacts on marine ornithological receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 4.1 Summary of impacts on marine ornithological receptors at the META project

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Waders, non-diving ducks	Disturbance/ displacement during all phases (Warrior Way only)	Negligible - Minor (adverse)	• Best practice measures	None required
Red-breasted merganser (a diving duck species)	Disturbance/ displacement during all phases (East Pickard Bay and Dale Roads)	Negligible (adverse)	• Best practice measures	None required
Scaup, red-breasted merganser, common scoter (diving ducks)	Disturbance/ displacement during all phases (Warrior Way only)	Negligible (adverse)	• Best practice measures	None required
Puffin, guillemot, razorbill, shag, gannet, kittiwake, cormorant, divers (seabird species)	Collision risk and displacement during all phases	Minor (adverse)	• Best practice measures • Minimum clearance of 2 m between operational turbine blades and sea-surface at Warrior Way (site 6) • Restricting ingress to rotating parts through wave device design	None required
Diving duck species (coastal bird species, in particular little grebe at Warrior Way (site 6))	Collision risk and displacement during all phases	Negligible (adverse)	• Best practice measures • Minimum clearance of 2 m between operational turbine blades and sea-surface at Warrior Way (site 6) • Restricting ingress to rotating parts through wave device design	None required
Cormorant, shag, duck species, divers, Manx shearwater, guillemot, razorbill, puffin, & gannet	Accidental pollution during all phases	Negligible - Minor (adverse)	• Marine Pollution Contingency Plan (MPCP)	None required

*To be developed in cooperation with regulators, industry, stakeholders and other developers

4.1.1.2 The META project sites lie in close proximity to a number of internationally and nationally designated sites with marine bird qualifying interest features. For example, the Milford Haven Waterway Site of Special Scientific Interest (SSSI in close proximity to Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8), comprises saltmarsh and mudflat habitats that support nationally significant numbers of overwintering wildfowl and wader. The closest internationally designated site is the Skomer, Skokholm and the seas off Pembrokeshire/ Sgomer, Sgogwm a Moroedd Penfro Special Protection Area (SPA) where qualifying features include a number of seabirds including: Atlantic puffin *Fratercula arctica,* European storm petrel *Hydrobates pelagicus*, lesser black-backed gull *Larus fuscus*, Manx shearwater *Puffinus puffinus*, razorbill *Alca torda*, common guillemot *Uria aalge*, and black-legged kittiwake *Rissa tridactyla*. The marine ornithology chapter identifies many of these seabird species as valued ecological receptors (VERs) within the study area together with wildfowl (such as brent goose *Branta bernicla*), waders (13 species including whimbrel *Numenius phaeopus*, golden plover *Pluvialis apricaria* and greenshank *Tringa nebularia*), non-diving ducks (pintail *Anas acuta*, shoveler *A. clypeata*, shelduck *Tadorna tadorna*, mallard *A. platyrhynchos*, teal *A. crecca* and wigeon *A. penelope*), diving ducks (scaup *Aythya marila*, red-breasted merganser *Mergus serrator,* common scoter *Melanitta nigra*) and divers (red-throated diver *Gavia stellata* and great northern diver *G. immer*).

4.1.1.3 The impact assessment considered the potential for disturbance to occur to coastal birds as a result of an increase in vessel traffic near the META test sites. Many species may be sensitive to disturbance, particularly during roosting or loafing and at high tide the sensitivity may be heightened as there may be less habitat available compared to low tide for individuals to occupy. Valued Ecological Receptors (VERs) assessed included diving ducks, non-diving ducks and waders and for most VERs the significance of the disturbance effects was assessed as negligible to minor (adverse). Due to the high sensitivity of the VERs, a number of mitigation measures have been proposed to reduce the potential disturbance on these features. In addition, it has been recommended that additional data is collected to provide an enhanced baseline prior to installation (and allowing for the implementation of adaptive management with respect to mitigation measures). These surveys will be continued post-installation as part of a proposed monitoring programme.

4.2 Mitigation – all bird species

4.2.1 Marine Pollution Contingency Plan

4.2.1.1 A Marine Pollution Contingency Plan (MPCP) will be developed and implemented to manage the impact of any accidental marine pollution event, by providing a response framework, a first strike plan based on the risk of a marine pollution incident, an alert and activation procedure, and integration with local national plans. This plan will be made available to all developers and contractors involved in the META project and they will be expected to comply with the measures set out in the plan at all times.

4.2.2 Best practice measures

4.2.2.1 Due to the high/very high sensitivity of some VERs, best practice measures have been identified in relation to reduce the potential for the activities associated with META to impact upon ornithological receptors. These include:

- All vessels associated with Project operations will comply with International Maritime Organisation (IMO) Maritime and Coastguard Agency (MCA) codes for prevention of oil pollution;
- All vessels associated with the META project operations will carry on-board oil and chemical spill mop up kits;
- Suitable vessels with competent crew according to task and local conditions will be used;
- Vessel activities associated with installation, operation, routine maintenance and decommissioning will occur in suitable weather conditions to reduce risk of accidental spill/pollution;
- Works will be timed to avoid sensitive periods for over-wintering coastal birds i.e. avoid works during period if possible or restrict works to warmer days; and
- Where works are carried out during the winter in proximity to high tide roosts for waders, suitable disturbance buffers will be in place to minimise the likelihood of any potential impacts (the size of buffers dependant on the species)
- Minimum clearance of 2 m between operational turbine blades and sea-surface at Warrior Way (site 6)
- Potential for bird Ingress to wave devices will be minimised through device design.

4.3 Pre-installation baseline surveys

4.3.1.1 Pre-installation baseline surveys associated with potential impact on little grebe were identified as a potential requirement at Warrior Way (site 6) only. Pre-installation surveys (two months, minimum of four observations) may be required where proposed device deployment and operation is out with little grebe breeding season (March to April inclusive). Details of pre-deployment survey to be undertaken will be agreed with NRW on a case-by-case basis.

4.4 Device-specific deployment surveys

4.4.1.1 Pre-deployment surveys for device-specific deployments associated with potential impacts on marine ornithological receptors were identified as potentially being required at East Pickard Bay (site 8). These may be required where a proposed device deployment at this site is expected to approach the maximum dimensions scenario (i.e. 147 m x 230 m), or a size to be agreed with NRW. Details of, and requirement for proposed pre-deployment surveys will be agreed with NRW on a case-by-case basis.

4.5 Monitoring

4.5.1.1 No monitoring associated with potential impact on marine ornithological receptors was identified.

4.6 Summary

4.6.1.1 Table 4.2 summarises the mitigation, survey and monitoring requirements for marine ornithological receptors in relation to the META project.

Table 4.2 Summary of the marine ornithological mitigation, surveys and monitoring proposed in this EMMP.

Phase	Action	Location	Objective	Programme
Mitigation	MPCP	All META sites	To reduce the potential for accidental pollution impact	Throughout operational phase
	Turbine blades to be minimum of 2 m below sea surface	Warrior Way (site 6)	To reduce potential for collision risk with birds	To be agreed with NRW on a case-by-case basis
	Potential for bird ingress to be minimised by device design	Dale Roads (site 7) and East Pickard Bay (site 8)	To reduce potential for bird collision risk	Throughout operational phase of device deployment
	Best Practice measures	All META sites	To reduce the potential for impact	Throughout operational phase
Pre-installation baseline surveys	Species specific survey (little grebe	Warrior Way (site 6)	Confirm species numbers at site when deployments are to	To be agreed with NRW on a case-by-case basis

Phase	Action	Location	Objective	Programme
			occur outside months of March – July (inclusive)	
Device-specific pre-deployment surveys	Potential requirement for pre-deployment marine ornithology surveys	East Pickard Bay (site 8)	To verify EIA baseline and impact assessment where device size is expected to approach the maximum dimensions scenario (i.e. 147 m x 230 m, or a size to be agreed with NRW).	To be agreed with NRW on a case-by-case basis where individual test deployments exceeding the agreed threshold
Monitoring of potential effects due to the META project	None required	All META sites	N/A	N/A

5. MARINE MAMMALS, BASKING SHARK AND OTTER

5.1 Summary of impacts and baseline

5.1.1.1 Table 5.1 provides a summary of the potential impacts on marine mammal and otter receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 5.1 Summary of impacts for marine mammal receptors, basking shark and otter

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Cetaceans, pinnipeds, otter and basking shark	Underwater noise from vessels during all phases	Minor (adverse)	Best practice measures	None proposed
Cetaceans, pinnipeds, otter and basking shark	Underwater noise from tidal turbines during operational phase (Warrior Way only)	Minor (adverse)	None proposed	None proposed
Cetaceans, pinnipeds, otter and basking shark	Collision risk from vessels during all phases	Minor (adverse)	Best practice measures	None proposed
Cetaceans, pinnipeds, otter and basking shark	Collision risk with tidal turbines during operational phase (Warrior Way only)	Negligible - minor	None proposed	Pre-device deployment otter survey
Cetaceans, pinnipeds, otter and basking shark	Entanglement risk during operational phase	Minor (adverse)	None proposed	None proposed
Cetaceans, pinnipeds, otter and basking shark	Increase in suspended sediment during construction and decommissioning phases	Negligible	None proposed	None proposed
Cetaceans, pinnipeds, otter and basking shark	Change in fish and shellfish communities during all phases	Minor (adverse)	None proposed	None proposed
Cetaceans, pinnipeds, otter and basking shark	Accidental pollution during all phases	Minor (adverse)	MPCP	None proposed
Cetaceans, pinnipeds, otter and basking shark	Changes in hydrodynamic regime during operational phase (Warrior Way only)	Minor (adverse)	None proposed	Pre-device deployment otter survey

5.1.1.2 A number of species were identified within the regional marine mammal, basking shark and otter study area, including: harbour porpoise *Phocoena phocoena*, bottlenose dolphin *Tursiops truncatus*, short-beaked common dolphin *Delphinus delphis*, Risso's dolphin *Grampeus griseus*, minke whale *Balaenoptera acutorostrata*, grey seal *Halichoerus grypus*, basking shark *Cetorhinus maximus* and European otter *Lutra lutra*.

5.1.1.3 The impact assessment considered a number of potential impacts (as outlined in Table 5.1) on marine mammal and otter receptors.

5.1.1.4 Harbour porpoise and common dolphin were the two cetacean species most likely to occur within the Waterway, in proximity to the META sites.

5.1.1.5 Grey seal is the only pinniped species which breeds in Wales. Breeding colonies are found in northwest Pembrokeshire, particularly on Ramsey Island, extending southwards to Skomer Island and northwards to southern Ceredigion. Historical data showed that low numbers of sightings were recorded for grey seal within the Waterway, suggesting this is not a key area for them. These data were, however, derived from incidental sightings and therefore do not give a true reflection of the occurrence and distribution of this species. Grey seals may move throughout the Waterway and are a qualifying interest feature of a number of SACs within the marine mammal, basking shark and otters regional study area.

5.1.1.6 Otters utilise the coastline within the Waterway.

5.1.1.7 There are no records of basking shark in the local study area therefore no further consideration of basking shark has been made within this EMMP.

5.2 Mitigation

5.2.1 Marine Pollution Contingency Plan

5.2.1.1 As stated in 4.2.1, an MPCP will be developed and implemented in order to manage the risk of accidental pollution in the marine environment.

5.2.2 Best Practice Measures

5.2.2.1 Best practice measures will be undertaken by vessel operators in the presence of marine mammals. Published guidelines are available from various sources, such as the Sea Watch Foundation marine code of conduct and Scottish Natural Heritage marine wildlife watching scheme. These documents included the following advice:

- Do not cut off animal or group of animals by moving across their path;
- Do not approach animals, particularly from behind;
- If you can see one animal at the surface, others may well be nearby, just below the surface, so keep a careful lookout;
- Maintain a steady speed in parallel to the animal, keeping to a minimum distance of >100 m;
- Avoid sudden, unpredictable changes in speed, direction and engine noise;
- Keep engines and propellers well maintained to minimise noise;
- Take extra care during sensitive times of the year in places where animals may be feeding, resting, breeding or with their young:
  - Do not intentionally flush seals into the sea.
  - Avoid landing or entering the sea adjacent to designated seal haul-outs.
  - Be careful not to split up groups, or mothers and young and never approach apparently lone young animals.

5.2.3 Marine Mammal Observer (MMO)

5.2.3.1 Should the provision of device-specific information (through device-specific EMPs) lead to a concern in relation to potential impacts on marine mammals during the installation and decommissioning phases of any device-specific activities, consideration will be given to the need for a Marine Mammal Observer (MMO) during such activities. The need for an MMO will be discussed with the relevant stakeholders on a case-by-case basis.

5.3 Pre-installation baseline surveys

No pre-installation surveys for marine mammals or otters are proposed within the META Environmental Statement, and NRW advisory confirmed in their Scoping response to the META project (January 2019), that no further data collection was deemed necessary. No pre-installation baseline surveys are therefore proposed.

5.4 Device-specific surveys

5.4.1 Otter walkover surveys

5.4.1.1 There was no site-specific information on the European otter *Lutra lutra* for the META sites, however the historical records show that this species is distributed widely throughout Pembrokeshire and this region may be a stronghold for otter in the UK. The Milford Haven Waterway Site of Special Scientific Interest (SSSI) supports nationally important numbers of otter, and otter is a designated feature of several Special Areas of Conservation (SACs) within the region, including Pembrokeshire Marine / Sir Benfro Forol SAC, Pembrokeshire Bat Sites and Bosherston Lakes / Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC and Cleddau Rivers / Afonydd Cleddau SAC.

5.4.1.2 The majority of sightings of otter for the local marine mammal, basking shark and otter study area are incidental and therefore there are uncertainties in the distribution and abundance of this species in relation to the META sites. The most recent population estimate for otter in Wales is from 2004 data and is given as 762 (JNCC, 2007), but there are no estimates given for the Waterway. Otter, as a VER, was assessed in the META Environmental Statement as being of very high value and this species is known to occur throughout the Waterway. In addition, there may be the requirement for device-specific activities to obtain an EPS licence to support their testing activities. Warrior Way (site 6) is considered most likely to have habitats likely to support otter.

5.4.1.3 Therefore, whilst there were no significant impacts on otter identified in the META Environmental Statement it is proposed that device-specific surveys are undertaken prior to device-deployment, to provide further site-specific and deployment specific information to support any EPS licencing requirements.

5.4.1.4 The key objectives of a device-specific otter survey are:

- To determine whether otter regularly use the habitats around Warrior Way (site 6) at the time of proposed device-deployment and testing activities; and
- To determine whether otter breed within or near to the habitats around Warrior Way (site 6).

Survey scope

5.4.1.5 Otter surveys can be undertaken at any time of year, but main activity is likely to be between the months of May to September. Otter surveys will involve a walkover of the coastal habitat in proximity to the Warrior Way (site 6) to look for signs of otter activity. These include evidence of spraints, footprints, food remains, otter slides (into water), holts, and couches (resting sites).

5.4.1.6 The survey will cover the coastal habitat and any other suitable habitat at Warrior Way (site 6) and will extend over a minimum of 200 m.

5.4.1.7 The survey will be undertaken by suitably trained and experienced field ecologists. Locations will be mapped and recorded using hand held GPS and photographic records taken to support the field notes taken.

5.4.1.8 Should otter activity be recorded in proximity to proposed activities at Warrior Way (site 6), further discussion with relevant stakeholders will be carried out to determine appropriate and proportionate measure that may be required.

Programme

5.4.1.9 If required, the device-specific otter survey will be carried out as a single visit between the months of May to September.

5.5 Monitoring

5.5.1.1 Monitoring of first deployments (installation, operation and maintenance, and decommissioning) to validate conclusions of assessment. Methodology as per section 5.4.1.

5.6 Summary

5.6.1.1 Table 5.2 summarises the mitigation, survey and monitoring requirements for marine mammal, basking shark and otter receptors in relation to the META project.

Table 5.2 Summary of marine mammal, basking shark and otter mitigation, surveys and monitoring proposed in this EMMP

Phase	Action	Location	Objective	Programme
Mitigation	MPCP	All sites	To manage the risk of accidental pollution in the marine environment	TBC
	Best Practice Measures	All Sites	To minimise disturbance to marine mammals and otters	TBC
	MMO during installation/decommissioning	Warrior Way	To minimise disturbance to marine mammals and otters	Device-specific requirement
Pre-installation baseline surveys	N/A	N/A	N/A	N/A
Device-specific surveys	Otter walkover survey	Warrior Way	Presence and site use to determine need for EPS licence	May - September 2019
Monitoring	Otter monitoring	Warrior Way	Presence and site use to determine potential impact on otters and to determine if mitigation measures will be required	May - September 2019

6. FISH AND SHELLFISH

6.1 Summary of impacts and baseline

6.1.1.1 Table 6.1 provides a summary of the potential impacts on fish and shellfish receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 6.1 Summary of impacts for fish and shellfish receptors.

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Fish and shellfish	Changes to habitat (habitat loss/ disturbance) during all phases	Negligible – Minor (adverse)	None proposed	None proposed
Fish and shellfish (low mobility species)	Increases in suspended sediment during installation and decommissioning phases	Minor (adverse)	None proposed	None proposed
Fish and shellfish	Accidental pollution during all phases	Negligible – Minor (adverse)	MPCP	None proposed
Fish and shellfish	Colonisation of hard structures during operational and maintenance	Negligible	None proposed	None proposed
Fish and shellfish	Tidal turbine collision risk during operational and maintenance phase (Warrior Way only)	Minor (adverse)	None proposed	None proposed
Migratory fish species	Physical barrier to movement during operational and maintenance phase (Warrior Way only)	Negligible – Minor (adverse)	None proposed	None proposed

6.1.1.2 A number of fish and shellfish receptors were identified as having the potential to occur in the META project area. These included an estuarine fish assemblage (e.g. gobies, dab and mullet); migratory fish species (e.g. sea trout (*Salmo trutta*), European eel (*Anguilla anguilla*), and Atlantic salmon (*Salmo salar*); spawning and nursery grounds for fish (e.g. spotted ray (*Raja montagui*);, whiting (*Merlangius merlangus*); and ling (*Molva molva*); designated shellfish waters (Cleddau Rivers (Eastern and Western and Carew River); estuarine shellfish assemblage (e.g. native oyster (oyster beds on shallow subtidal muddy sediment; mussel beds; and common cockle (*Cerastoderma edule*); and spawning and nursery grounds for shellfish (*Nephrops*).

6.1.1.3 The impact assessment considered a number of potential impacts (as outlined in Table 6.1 on fish and shellfish receptors).

6.2 Mitigation

6.2.1 Marine Pollution Contingency Plan

6.2.1.1 As stated in 4.2.1, an MPCP will be developed and implemented in order to manage the risk of accidental pollution in the marine environment.

6.3 Pre-installation surveys

6.3.1.1 No pre-installation surveys are proposed for fish and shellfish receptors.

6.4 Device-specific surveys

6.4.1.1 No surveys for device-specific deployments are proposed for fish and shellfish receptors.

6.5 Monitoring

6.5.1.1 No monitoring is proposed for fish and shellfish receptors.

6.6 Summary

6.6.1.1 Table 6.2 summarises the mitigation, survey and monitoring requirements for fish and shellfish receptors in relation to the META project.

Table 6.2: Summary of fish and shellfish mitigation, surveys and monitoring proposed in this EMMP.

Phase	Action	Location	Objective	Programme
Mitigation	MPCP	All sites	To manage the risk of accidental pollution in the marine environment	TBC
	Device Design	Dale Roads (site 7) and East Pickard Bay (site 8)	To minimise collision risk with wave devices	Throughout operation phase of devices
Pre-installation baseline surveys	None required	All Sites	N/A	N/A
Device-specific surveys	None required	All Sites	N/A	N/A
Monitoring of potential effects due to the META project	None required	All Sites	N/A	N/A

7. BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY

7.1 Summary of impacts

7.1.1.1 Table 7.1 provides a summary of the potential impacts on benthic subtidal and intertidal receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 7.1 Summary of impacts for marine benthic receptors

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Benthic habitats and species (in particular Annex 1 reef habitat)	Habitat disturbance/ loss during all phases	Negligible - minor (adverse)	Pre-deployment Annex 1 reef surveys	None
Benthic habitats and species	Increase in SSC and associated sediment deposition during construction and decommissioning phases	Negligible	None	None
Benthic habitats and species	Resuspension of contaminated sediments during construction and decommissioning phases	Negligible	None	None
Benthic habitats and species (in particular Annex 1 reef habitat)	Alteration of seabed habitats during operational and maintenance phase	Negligible	None	None
Benthic habitats and species	Introduction of invasive non-native (INNS) species during all phases	Negligible - minor (adverse)	Invasive species management plan	None

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Benthic habitats and species	Accidental pollution during all phases	Negligible - minor (adverse)	Marine Pollution Contingency Plan	None

7.1.1.2 A number of benthic habitat and species receptors were identified as having the potential to occur in the META project area, including intertidal and subtidal VERs. Intertidal VERs include Annex I habitat '*Mudflats and sandflats not covered by seawater at low tide'*; Annex I intertidal '*Reefs'* habitat; intertidal seagrass (*Zostera noltii*); and Annex I habitat '*Atlantic salt-meadow (Glauco-Puccinellietalia maritimae*)' (including *Salicornia* spp.). Subtidal VERs include Annex I subtidal '*Reef*' habitat (e.g. estuarine rocky habitats, subtidal mixed muddy sediments and tide swept channels); Annex I '*Estuaries'* (e.g. intertidal mudflats; maerl; and seagrass beds); Annex I 'Large shallow inlets' (e.g. fragile sponge and anthozoan communities on subtidal rocky habitats; and intertidal underboulder communities); subtidal seagrass (*Zostera* marine); maerl beds (*Phymatolithon calcareum*); Annex I '*Sandbanks which are slightly covered by sea water all the time*' habitat (gravelly and clean sands; and muddy sands); circalittoral coarse sediment; and submerged or partially submerged sea caves.

7.1.1.3 The impact assessment considered a number of potential impacts (as outlined in Table 7.1 on benthic subtidal and intertidal receptors).

7.2 Mitigation

7.2.1 Marine Pollution Contingency Plan

7.2.1.1 As stated in paragraph 4.2.1 an MPCP will be developed and implemented in order to manage the risk of accidental pollution in the marine environment.

7.2.2 Micro-siting of devices or components on the seabed

7.2.2.1 Where devices, components or moorings may touch the seabed where sensitive habitats (e.g. Annex 1 reef) may occur, micro-siting following device-specific surveys (see section 7.4) to avoid direct impacts to these sensitive habitats will take place.

7.2.3 Invasive non-native species management plan

7.2.3.1 An Invasive Non-native Species Management Plan (INNSMP) detailing how the risk of potential introduction and spread of INNS will be minimised will be included in the META EMP. The plan will outline measures to ensure vessels comply with the International Maritime Organization (IMO) ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted in the event that a high alert species is recorded

7.3 Pre-installation surveys

7.3.1.1 No pre-installation surveys associated with potential impact on benthic subtidal and intertidal ecology receptors were identified.

7.4 Device-specific surveys

7.4.1 Pre-deployment benthic survey

7.4.1.1 A post-consent/pre-deployment benthic survey will be undertaken to facilitate micro-siting of infrastructure on the seabed, in order to avoid placing infrastructure at Annex I reef. In the first instance, these surveys will comprise a comprehensive review and interpretation of the geophysical survey data available for these sites (as presented in chapter 7: Benthic Subtidal and Intertidal, Appendix 7.1) by a suitably qualified and experienced marine ecologist / geophysicist, to identify any areas of potential reef features or sensitive habitat features that may be present. In the event that acoustic signatures synonymous with potential reef presence for example are identified from the geophysical data, it is proposed that these would be subject to further ground-truthing via a pre-deployment survey, the exact format of which would be agreed with NRW at the time. The pre-deployment survey, if required, would likely utilise remote sampling techniques (e.g. drop-down video) to establish the presence or absence of any reef features or other sensitive habitats features, and where present to determine their extent. These surveys will ensure that measures can be designed, if necessary, (e.g. micro-siting of moorings etc.) to avoid direct impacts to sensitive habitats such as reefs and seagrass at these sites.

7.4.1.2 These pre-deployment benthic surveys will take place at Warrior Way (site 6), and Dale Roads (site 7) where concern has been raised by statutory stakeholders over possible impacts on Annex 1 benthic habitats.

7.5 Monitoring

7.5.1.1 No monitoring associated with potential impact on benthic subtidal and intertidal ecology receptors is proposed.

7.6 Summary

7.6.1.1 Table 7.2 summarises the mitigation, survey and monitoring requirements for benthic subtidal and intertidal receptors in relation to the META project.

Table 7.2 Summary of benthic subtidal and intertidal ecology mitigation, surveys and monitoring proposed in this EMMP.

Phase	Action	Location	Objective	Programme
Mitigation	MPCP	All sites	To manage the risk of accidental pollution in the marine environment	N/A
	INNSMP	All sites	To manage the risk of introduction of non-native species	N/A
	Micro-siting of devices, components and moorings	Warrior Way and Dale roads	Avoidance of impact on sensitive benthic habitats	TBC
Pre-installation baseline surveys	None required	All sites	N/A	N/A
Device-specific surveys	Pre-deployment benthic survey	Warrior Way (site 6) and Dale Roads (site 7)	A post-consent/pre-deployment benthic survey will be undertaken to facilitate micro-siting of infrastructure in order to avoid placing infrastructure at Annex I reef	N/A
Monitoring of potential effects due to the META project	None required	All sites	N/A	N/A

8. MARINE ARCHAEOLOGY

8.1 Summary of impacts

8.1.1.1 Table 8.1 provides a summary of the potential impacts on marine archaeological receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 8.1 Summary of impacts for marine archaeology receptors.

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Buried prehistoric deposits	Removal or disturbance of sediments (all phases)	Minor (adverse)	Preliminary investigation to confirm the presence of prehistoric deposits through review of seabed survey data (should this be collected)	None
Archaeological resources (including shipwrecks)	Removal or disturbance of archaeological resource (all phases)	Minor (adverse)	Preliminary investigation to confirm the presence of shipwrecks through review of seabed survey data (should this be collected)	None
Buried prehistoric deposits and archaeological resources (including shipwrecks	Sediment deposition on the seabed (installation and decommissioning phases)	Negligible to Minor (adverse)	None proposed	None

8.1.1.2 Warrior Way (site 6) falls within the registered landscape of Milford Haven Waterway, and also lies within MCA 21 – Milford Haven, and within SSCA 32 – Inner Milford Haven. A review of marine archaeological data has returned no designated or non-designated sites within Warrior Way (site 6), however, two non-designated heritage assets were identified for this site including Areas 46 and 45 of Dyfed Archaeological Trust's "Milford Haven Waterway Ports and Harbours" survey (coinciding with Warrior Way). Area 46 shows the occurrence of prehistoric deposits within the local area which may be affected by the proposed activities. This was categorised as an area of possible sediment with medium archaeological potential, an acoustic survey was undertaken in this area which suggests some sediment may survive of Palaeolithic/Mesolithic interest. Area 45 (Major Bay/ Landing Points) was deemed to be of high archaeological potential, however, the archaeological potential is assessed as low for the site, which lies at the southern edge of Area 45, in the centre of the waterway, and therefore furthest from the landing points.

8.1.1.3 Dale Roads (site 7) falls within the registered landscape of Milford Haven Waterway, and also lies within Marine Character Area 21 - Milford Haven and within Seascape Character Area 31 - Outer Milford Haven. A review of marine archaeological data has returned no designated sites within the Dale Roads (Site 7), however, a number of non-designated heritage assets were identified for this site including Areas 23, 34 and 25 of Dyfed Archaeological Trust's "Milford Haven Waterway Ports & Harbours Project" survey (Possible Sediment). Area 23 was categorised as an area of possible sediment with medium archaeological potential. An acoustic survey was undertaken in this area which suggests some sediment of Palaeolithic/Mesolithic interest may survive. Area 34 (Major Bay / Landing Point) was deemed to be of high archaeological potential for material culture associated with the use of Dales Road as a major bay / landing point in the post-Medieval and Modern periods, however, low archaeological potential for the early pre-historic and post-Medieval period is assessed for the site due to distance to Dale Roads bay itself. This area was not covered by surveys or boreholes, but sediment survival would appear likely. Area 25 (Lindsway Bay) is deemed to be of medium archaeological potential for the early Prehistoric, post-Medieval and Modern periods as a small sandy bay, without easy access and therefore likely to have seen little use. Levels suggest possible sediment survival, but area is not surveyed or bore-holed.

8.1.1.4 East Pickard Bay (site 8) falls within the South Pembrokeshire Heritage Coast, and also lies within Marine Character Area 22 - South Pembrokeshire Coastal and Inshore Waters and Seascape Character Area 34 - Freshwater West. A review of marine archaeological data has returned no designated sites within East Pickard Bay (site 8), however, a number of non-designated heritage assets were identified for this site. An unnamed wreck / 'Highland Home' was identified and this site has high potential for deposits dated to the post-Medieval period, specifically associated with the wreck mapped on site, believed to be the Highland Home. East Pickard Bay site (site 8) has medium potential for archaeological deposits dating to the Prehistoric period, associated with the proximal record of a Prehistoric submerged forest, and finds on the intertidal zone in the proximity of West Pickard Camp. There was also low archaeological potential for unknown wrecks dating to the post-Medieval Modern period to be located within the site.

8.2 Mitigation

8.2.1.1 Mitigation will be employed to avoid potential impacts on sensitive archaeological receptors through design alterations or micrositing in placement of marine renewable energy devices. Planning Policy Wales (Edition 10, Welsh Government, December 2018) states that: "*Where nationally important archaeological remains are likely to be affected by proposed development, there should be a presumption in favour of their physical protection in situ. It will only be in exceptional circumstances that planning permission will be granted if development would result in a direct adverse impact on a scheduled monument (or an archaeological site shown to be of national importance*".

8.2.1.2 The mitigation measures will be determined following a review of information collected through site investigation surveys as part of the pre-installation phase (see section 8.4) Archaeological remains would, in most scenarios, be classed as an 'obstruction', and therefore the information from pre-deployment installation surveys must be reviewed to allow the marine archaeologist to determine the potential impacts on archaeological features and, if there is potential for a significant effect, to advise on relocating the anchor deployment by an appropriate distance (i.e. micro-siting). This may either be carried out in advance (if information is available) or may be carried out *in situ* with a suitably experienced marine archaeologist on board the installation vessel, if time constraints require this.

8.3 Pre-installation surveys

8.3.1.1 No pre-installation surveys were identified in the META marine archaeology assessment.

8.4 Device-specific surveys

8.4.1.1 There are no specific device-specific pre-installation surveys required for marine archaeology, however, data from other pre-installation surveys (e.g. geophysical investigations), will be passed onto a suitably experienced marine archaeologist for review to advise on mitigation measures (Section 8.2).

8.4.1.2 Should further surveys be required to determine the positioning of anchors for specific marine renewable energy devices (e.g. drop-down video, topographic surveys), these data will also be passed onto a suitably experienced marine archaeologist for review in order to advise on device-specific mitigation measures (Section 8.2). As described above (Section 8.2) it may be necessary to station a marine archaeologist on board installation vessels to provide advice on device-specific deployment within the test sites.

8.5 Monitoring

8.5.1.1 No marine archaeology monitoring to test the predictions made within the operational and maintenance phase impact assessment is considered necessary, however, the LCG No. 15 (NPRN 273,231), 180 m to the south of the East Pickard Bay (site 8) site, is a Protected Place under the Protection of Military Remains Act (1986). This Act makes it an offence to interfere with the wreckage of any designated vessel without a licence, and appropriate consultation should be made with regards to work in the vicinity to establish the radius of the protected area.

8.6 Summary

8.6.1.1 Mitigation measures have been proposed to avoid potential significant effects on sensitive marine archaeological features. There are no surveys or monitoring required.

Table 8.2: Summary of marine archaeology mitigation, surveys and monitoring proposed in this EMMP.

Phase	Action	Location	Objective	Programme
Mitigation	Micro-siting of devices/components	All sites	To avoid impact on archaeological interests	TBC
Pre-installation baseline surveys	None required	All sites	N/A	N/A
Device-specific surveys	Archaeologist review of any survey data collected	All sites	To inform micro-siting to avoid impact on archaeological interests	TBC
Monitoring of potential effects due to the META project	None required	All sites	N/A	N/A

9. COASTAL PROCESSES

9.1.1.1 Table 9.1 provides a summary of the potential impacts on coastal processes receptors as a result of the META project, as outlined in the META project Environmental Statement.

Table 9.1 Summary of impacts for coastal processes.

Receptor	Potential effect	Significance of effect	Proposed mitigation	Proposed monitoring
Benthic ecology; fish and shellfish ecology	Increases in SSC and deposition of disturbed sediment to the seabed (all phases)	Negligible (adverse) see chapter 7.	None required	None required
Benthic ecology; fish and shellfish ecology	Release of contamination adsorbed to sediments	Negligible (adverse) See chapter 7.	None required	None required
Coastal processes (wave climate and sediment transport regimes)	Changes to the wave regime (operational phase; Dale Roads and East Pickard Bay)	Minor (adverse)	None required	None required
Coastal processes (hydrodynamics)	Changes in hydrodynamics (operational phase; Warrior Way only)	Minor (adverse)	None required	None required
Coastal processes (metocean regime: (wave, sand and currents)	Scour of seabed sediments (operational phase; Dale Roads and East Pickard Bay)	Minor (adverse)	Mitigation determined on basis of pre-installation assessment	Pre-installation assessment of scour
Coastal processes (sediment transport)	Interruption of sediment transport pathways (operational phase; all sites)	Minor (adverse)	None required	None required

9.1.1.2 The Warrior Way (site 6) and Dale Roads (site 7) sites are both located within the coastal processes study area. The Waterway is a deep-water macro-tidal ria believed to be created by the flooding of the Daugleddau river valley (which itself was formed by the merging of the tributaries of the Eastern and Western Cleddau), during the sea level rise at the end of the last Ice Age (Halcrow, 2012). It is the largest flooded valley in Europe and is also a historical deep-water anchorage. The Waterway has the capacity to be a large sediment sink, based on its morphology, however there is limited sediment input from offshore areas and the rivers flowing into the Waterway are not thought to contribute large volumes of sediment (Halcrow, 2012). Within the catchment are the two main rivers of the Western and Eastern Cleddau, which merge to form the Daugleddau before entering the Waterway. Pembroke River also flows into to the Waterway just west of Pembroke Dock.

9.1.1.3 Warrior Way (site 6) is situated entirely within the Pembrokeshire Marine/Sir Benfro Forol SAC, east of the Cleddau bridge, in a semi-diurnal tidal setting with a meso-tidal range. The tidal range propagates from the mouth of the Waterway up into the estuary, with high tide moving in a west to easterly direction. This stretch of the estuary supports the greatest tidal resource in the Milford Haven Estuary (1.2 m/s) and has a depth of between 16-19 metres chart datum[1] (CD). Currents are predominately flowing in an east to westerly direction as a result of the river flow from the eastern and western Cleddau rivers that form a confluence and flow into Daugleddau river, constituting the Waterway.

9.1.1.4 Dale Roads (site 7) is situated in a semi-diurnal tidal setting with a meso-tidal range, the tidal wave propagates from west to east (i.e. high tide occurs from the west and moves eastward into the estuary). The tidal range within the site is heterogeneous. The site is located circa 200 m offshore, with the closest shoreline being to the north and east of the side. Currents are predominately determined by the tide flowing in and out of the Waterway in a semi-diurnal cycle with sediment accumulation on the periphery of the bay at the Dale Roads site (site 7) with mud flat backed by sandstone. The site is characterised by medium sand (0.06-0.25 mm) over silt/clay (Germano, 2012). The material is very poorly sorted with material being finer at the north west corner of the site. Dale Roads supports depths of between 8 and 12 metres CD and benefits from a significant wind and wave fetch from the south and southwest.

9.1.1.5 The East Pickard site (site 8) is located 0.5 km from the shoreline to the north east which consist of rock cliffs with rocky outcrops. The eastern extent of the site is 0.75 km from the north west edge of Freshwater West Bay, which comprises a sandy beach 0.5 km wide at low water and backed by dunes. Tidal range within the East Pickard Bay site (site 8) remains fairly consistent with minimal variation throughout seasonal cycles. The predominate current runs from an east to west direction through the site, and a strong rip tide can be found at the south of Freshwater West Bay. East Pickard Bay (site 8) is exposed to a good wave resource benefiting from a 200 km fetch from the prevailing wind direction and has a water depth of between 10 and 29 m CD.

9.2 Mitigation

9.2.1.1 Mitigation to reduce scour effects on a device-specific basis for devices deployed at the Dale Roads (site 7) and East Pickard Bay (site 8) test sites is recommended on a device-specific deployment basis. A pre-installation desk based scour assessment based on established knowledge will be used to inform the mitigation measures to be employed (Section 9.3).

9.3 Pre-installation surveys

9.3.1.1 There are no pre-installation surveys proposed for coastal processes receptors.

9.4 Device-specific surveys

[1] The level below which depths are indicated and above which heights of the tides are expressed; usually mean level of low water at a spring tide.

9.4.1.1 No device-specific surveys are recommended in relation to Coastal Processes receptors, however a device-specific desktop scour assessment is recommended and is detailed below in section 9.4.2.

9.4.2 Scour assessment

9.4.2.1 A scour assessment based on the META Project Description was based on a maximum adverse scenario in relation to potential scour effects. The presence or amount of scour depends on a number of parameters; the structure i.e. its shape, the width presented to the oncoming flow and the height of the structure with respect to the water column. It also depends on the flow characteristics i.e. current speed and orientation. Finally, it depends on the bed material; the sediment size, cohesion and depth.

9.4.2.2 All of these items are variable across each site, for each device and for each foundation type. Given the potential for seabed scour to be affected by these device-specific parameters, as a precautionary measure, an assessment of scour will be undertaken prior to installation of devices or components on a case-by-case basis. Detailed foundation design will establish where scour may be an issue and provide mitigation as appropriate.

9.5 Monitoring

9.5.1.1 There is no monitoring proposed for coastal processes receptors.

9.6 Summary

9.6.1.1 Table 9.2 summarises the mitigation, survey and monitoring requirements for coastal processes receptors in relation to the META project.

Table 9.2 Summary of coastal processes mitigation, surveys and monitoring proposed in this EMMP.

Phase	Action	Location	Objective	Programme
Mitigation	Mitigation to be proposed on a device-specific basis	Dale Roads (site 7) and East Pickard Bay (site 8)	To reduce scour effects on a device-specific basis	Device-specific
Pre-installation baseline surveys	None required	All sites	N/A	N/A
Device-specific surveys	Scour assessment	Dale Roads (site 7) and East Pickard Bay (site 8)	To determine the potential for scour to arise from each device and inform mitigation	Pre- device installation
Monitoring of potential effects due to the	None required	All sites	N/A	N/A
META project				

10. REFERENCES

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Appendices

A.2.1.1.1.1.

Appendix A

Coastal bird survey plan

Appendix A – Seabird survey plan

A.1.1.1.1. Detailed survey approach for seabirds surveys and monitoring will be agreed post-consent in liaison with key stakeholders and on a case-by-case basis as agreed with NRW.

Appendix B

Otter survey plan

Appendix B – Otter survey plan

A.1.1.1.2. Detailed survey approach for otters will be agreed post-consent in liaison with key stakeholders.