MARINE ENERGY WALES

MARINE ENERGY TEST AREA (META)

Environmental Impact Assessment

Chapter 2:

Project Description

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Table of Contents

Table of Tables

Glossary

Term	Definition
Balance of Plant	Balance of plant describes the infrastructure of a wind turbine with the exception of the wind turbine itself, typically relating to the foundation, transition piece, cabling and Supervisory Control and Data Acquisition (SCADA) systems
Decommissioning phase	The period over which retrieval and removal of META infrastructure from proposed test areas will occur.
Deployment and retrieval	Activities associated with installation and decommissioning of devices / components. Specific methodologies will be provided in the Device Installation & Operation Method Statement (DIOMS) and Risk and Method Statement (RAMS) on a case-by-case basis.
Draught	The vertical distance between the waterline and the bottom of the hull of a marine vessel.
Dynamic Positioning	Use of a vessel's thrusters and propellers to maintain position
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement.
Environmental Management Plan	Document that sets out the environmental framework within which the project will be delivered including covering consents and legislative requirements. The plan will include sub-plans where these are required e.g. Marine Pollution Contingency Plan.
Environmental Mitigation and Monitoring Plan	A document detailing the mitigation and monitoring proposed to be undertaken at the META project sites. The plan will detail the mitigation and monitoring considered necessary (to be agreed with relevant stakeholders), the receptors to be monitored, the timing of proposed monitoring, and the methodologies to be followed.
Floating Wind Technology Component Testing	Floating wind technology component testing includes testing of floating wind balance of plant, likely to be associated with a semi-submersible platform. No testing of the tower or wind turbine would be involved.
Impact	Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Installation phase	The period over which META infrastructure and project-specific infrastructure may be installed within META test sites.
Maximum Scenario	The project parameters which are considered likely to result in the greatest potential impact on the receiving environment.
MHWS	The height of mean high water springs is the average throughout the year (when the average maximum declination of the moon is 23.5°) of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Micro-tidal	Full scale tidal device of a small size (less than 5m rotor diameter), that is the intended final size.
MLWS	The height of the mean low water springs is the average height obtained by the two successive low waters during the same period as mean high water springs.
Most Likely Scenario	The project parameters which are considered most likely to occur/be deployed within the META project sites.
Operation and maintenance phase	The period over which operational and maintenance activities to support marine energy testing at META sites may occur.
ORJIP Ocean Energy	A UK-wide collaborative programme of environmental research with the aim of reducing consenting risks for wave, tidal stream and tidal range projects.
Pembrokeshire Coastal Forum	Community interest company that works to protect the coast and marine environments for current and future generations.
Pembroke Dock Marine (PDM)	Project aiming to develop a world class centre for marine energy development, fabrication, testing and deployment. Part of the wider Swansea Bay City Deal.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Rock ballast	Weight required in the form of rocks (in bags). In the case of the META project, rock ballast could be used as part of a marine energy device foundation or seabed attachment method.
Salvage methodology	Methods to clear detritus from the seabed.
Scaled tidal device	A scaled version of a full-scale tidal device i.e. a ¼ scale device will be a quarter of the size of a full-scale device.
Seabed clearance	Clearance of areas of seabed for some devices to allow safe attachment to/placement on the seabed.
Swansea Bay City Deal	A project aiming to drive the Welsh economy forwards, increasing productivity, supporting jobs and increasing investment in the Swansea Bay City Region.
Swept area	Cross-sectional area that tidal turbine blades/rotor will sweep when it is rotating – i.e. a circular area the diameter of the turbine blades/rotor.
The META project	Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8).
The Waterway	The Milford Haven Waterway
Yaw	Movement of an object about a vertical axis

Acronyms

Acronym	Description
ADCP	Acoustic Doppler Current Profiler
DEFRA	Department for Environment, Food and Rural Affairs
DIOMS	Device Installation & Operations Method Statement
DP	Dynamic Positioning
EIA	Environmental Impact Assessment
EMMP	Environmental Mitigation and Monitoring Plan
EMP	Environmental Management Plan
HSE	Health and Safety Executive
INNS	Invasive Non-Native Species
INNSMP	Invasive Non-Native Species Management Plan

Acronym	Description
MCA	Maritime and Coastguard Agency
MEECE	Marine Energy Engineering Centre of Excellence
META	Marine Energy Test Areas
MEW	Marine Energy Wales
MHPA	Milford Haven Port Authority
MHWS	Mean High Water Springs
ML	Marine Licence
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
NPS	National Policy Statement
NRW	Natural Resources Wales
NRW-MLT	Natural Resources Wales – Marine Licencing Team
ORJIP OE	Offshore Renewables Joint Industry Programme Ocean Energy
PCF	Pembrokeshire Coastal Forum
PDE	Project Design Envelope
PDM	Pembroke Dock Marine
PDZ	Pembrokeshire Demonstration Zone
RAMS	Risk and Method Statements
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WEC	Wave Energy Converter

Units

Unit	Description
Ha	Hectare
km	Kilometre
m	Metre
mm	Millimetre
month	Calendar month
m^2	Metres squared
MW	Megawatt (electrical power)
m/s	Metres per second
NM	Nautical Mile

2. PROJECT DESCRIPTION

2.1 Introduction

2.1.1.1 This chapter provides a description of the project and forms the basis for the environmental impact assessment provided in this Environmental Statement.

2.1.1.2 The effects of the project have been assessed throughout the Environmental Statement based both on a maximum scenario and a most likely scenario. For example, installation information is presented for the 'maximum scenario' with the 'most likely scenario' provided for context. A number of measures which would reduce or avoid adverse environmental effects arising have been included as part of the project design. Details of all measures are provided in this chapter, and those that are relevant to each topic are set out in each topic chapter. This chapter, together with the subsequent topic chapters provides the data required to identify and assess the likely significant effects of the project in accordance with Regulation 18 and Schedule 4 of the EIA Regulations.

2.2 Purpose of this chapter

2.2.1.1 The primary purpose of the Environmental Statement is to support the marine consent applications for the META project, which are outlined in chapter 1: Introduction.

2.2.1.2 This chapter provides a description of the META project and its key components, including any ancillary offshore equipment, and an overview of the approach to installation, operation and maintenance, and decommissioning works in the marine environment.

2.3 Policy context

2.3.1.1 Marine Energy Wales's (MEW) proposed Marine Energy Testing Area (the META project) forms part of Pembroke Dock Marine (PDM), a £76 million project to develop a world class centre for marine energy development, fabrication, testing and deployment, in Pembrokeshire[1]. It is one of 11 projects included in the Swansea Bay City Deal signed in 2017.

2.3.1.2 The four pillars of the PDM project are the:

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

2.3.1.3 The Overarching National Policy Statement for Energy (EN-1) states that *'the Environmental Statement should set out, to the best of the applicant's knowledge, what the maximum extent of the proposed development may be in terms of site and plant specifications, and assess, on that basis, the effects which the project could have to ensure that the impacts of the project as it may be constructed have been properly Assessed'.*

2.3.1.4 The NRW Guidance note: GN13 – Scoping an Environmental Impact Assessment for Marine Developments (NRW 2017), advises:

"the entire project should be described in as much detail as possible to allow the licensing authority(ies), consultees and other stakeholders to understand the proposal. This description should cover construction, operation and, if relevant, the decommissioning phases, and include detailed scaled maps and drawings appropriate".

2.3.1.5 Though this guidance is in relation to Scoping of marine projects, it has also been considered in the production of the project description set out within this chapter.

2.4 Consultation

2.4.1.1 A summary of the key issues raised during consultation relevant to chapter 2: Project Description is outlined below in Table 2.1~~Table 2.1~~, together with how these issues have been considered in the production of this Environmental Statement chapter or how the Applicant has had regard to them.

[1] http://www.marineenergywales.co.uk/marine-energy-in-wales/projects/pembroke-dock-marine/

Table 2.1: Summary of key issues raised during consultation activities undertaken for the META project relevant to the Project Description.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
July 2017	Fisheries – local representative	Initial introduction to concept. Further engagement requested once areas defined and better assessed, to enable review of likely interactions.	Further engagement to establish any impacts on PDE due to fisheries interest post-EIA Scoping.
October 2017	Device Developers – direct engagement	Need for test areas to "get stuff wet" in water depths between 5-10 m; areas that see wave action and others that see tidal resource >1.5m/s; some "real-sea" conditions with good wave heights desirable.	Sites identified within search area that meet some or all of these requirements identified. See chapter 1: Introduction - Figure 1.1.
October 2017	Natural Resources Wales – advisory - informal	Split sites into phases and by technology type. Define activities, infrastructure and operational features to form a Project Design Envelope and allow screening/scoping.	Sites split into phases (1 and 2) depending on testing activities to be supported. Activities, infrastructure and operational features associated with the META project (Phase 2) are described in this chapter.
November 2017	Milford Haven Port Authority (MHPA) – direct engagement	Health and Safety considerations due to existing port activities.	Some identified sites eliminated from further consideration, and others realigned (See chapter 3 – Need and Alternatives).
December 2017	Element Power – direct engagement	Potential overlap with Element Power Greenlink Interconnector.	Clarified that the Greenlink cable route would not have any direct impacts on the proposed META site at East Pickard Bay (site 8) and similarly META project would not directly impact the Greenlink cable route.
December 2017	MHPA	Confirmed that areas outlined were outwith significant areas of concern for Shipping and Navigation.	No response required.
Q4 2017	Device Developers - Developer Questionnaire	Key infrastructure, equipment and consents that technology developers would require to support their testing were highlighted.	META consenting strategy developed (key consents summarised in chapter 1, and key infrastructure and equipment included in the Project Design Envelope (chapter 2).
Q4 2017	WaveHub Ltd. - Pembrokeshire Demo Zone developer	Opportunity for strategic alignment.	Advice noted. Opportunities for strategic alignment will be identified where possible.
May 2018	MOD – Rural Steering Group	Concept presented, and proposed locations identified. One site located adjacent MOD firing range. Requested to be kept informed	Clarified that no direct impact to range. Ongoing updates through attendance at scheduled Rural Steering Group Meetings
July 2018	NRW-MLT	Splitting of META Phase 1 and Phase 2	This has been resolved and NRW-MLT content that these are separate projects with separate PDEs.
September 2018	Device Developers and Marine Renewables Industry – Project Design Envelope workshop	Clarify definition of Phase 1 versus Phase 2. Provide a description of the META project activities, including testing parameters at each META site. Ensure parameters are appropriate for developer needs. Do not limit number of vessels or have a larger maximum number. Have a maximum draught and length of vessel rather than specify types of vessel. Limit antifoulants to "EU/Internationally approved standard". Increase dimensions allowable at the META project (Phase 2). Include gravity bases. Increase frequency of allowable vessel visits. Add in decommissioning and salvage operation testing at Warrior Way. Include pin-piling at Dale Roads.	All amendments made, including clarification of which META sites are Phase 2 in chapter 1 – Introduction increasing allowance at the META project sites and inclusion of gravity bases (Section 2.5.3).
November 2018	Stakeholders – Project Design Envelope Workshop	Consent under one Marine Licence (ML) rather than separate MLs	MEW are seeking a single ML for all three META sites (Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8)).

01 January 2019	MCA	The mooring arrangements for the floating turbines should be carried out in accordance with the MCA and HSE Guidance 'Regulatory expectations on moorings for floating wind and marine devices', which also include Third Party Verification. This document is available via the above link.	This requirement has been taken account of in "Appearance and Design" paragraph 2.5.2.6.
28 March 2019	NRW Scoping Opinion	The description of the project as a whole is clear but there is some detail lacking on the scale of the devices to be deployed and the anticipated benthic footprint (see general comments for more detail).	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	We agree with the use of a project design envelope as a framework for consenting. However, we consider that the difference in scale between the likely deployment scenario and the maximum (worst case scenario) is quite large. This leads to further uncertainty in terms of scale of devices to be deployed and their possible deployment location with the larger test areas (see general comments for more detail).	Refinements to chapter 2: Project Description have been made to clarify Maximum and Most Likely scenarios, including reduction in Maximum scenario at Warrior Way (site 6) and Dale Roads (site 7). An appendix of device types has been provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	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. Section 2.4.3: The proposed area currently overlaps with Pembrokeshire Marine SAC reef feature as well as mobile sand habitat which does not form part of an Annex I feature of the SAC. We advise that, in order to minimise the risk of impact to this SAC feature, the test area is revised and moved slightly to the south to focus the area on sand substrate only. The bathymetric survey already completed should be sufficient to establish the difference between the reef and sand habitats which can then be used to inform a revised area. If these changes are made then we do not consider that further surveys would be required within this area, because: Mobile sand is resilient to the habitat disturbance and temporary loss of habitat. There would likely be a quick recovery of the habitats affected. The habitat is not part of a SAC feature.	Amendments made to East Pickard Bay (site 8) to remove overlap with Annex 1 reef habitat. Amendments are highlighted in chapter 3: Need and Alternatives.
28 March 2019	NRW Scoping Opinion	What does the decommissioning phase consist of? What will be removed and what will be remaining in situ?	Paragraph 2.5.2.25 and 2.5.2.26 outlines the difference between META project decommissioning and device-specific decommissioning.
28 March 2019	NRW Scoping Opinion	We consider that construction impacts should also be included – debris, pollutants etc. Construction methods need to ensure that pollutants and debris on the seafloor are minimised.	A marine pollution control plan (MPCP) that includes control of potential pollutants will be agreed with stakeholders during the post-submission phase. Waste management will follow MHPA waste management procedures.
28 March 2019	NRW Scoping Opinion	Given the proposed time scale for deployments the potential impacts to coastal processes are likely to be short term and recoverable. However, the suggested refinement of the PDE above will help to resolve potential issues around multiple deployments over a wide area.	The Project Description has been refined to clarify number of deployments proposed in a 12-month period and to reduce proportion of devices touching the seabed.

28 March 2019	NRW Scoping Opinion	The description of the project as a whole is clear but there is some detail lacking on the scale of the devices to be deployed and the type of devices likely to be deployed	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	The description of the project as a whole is clear but there is some detail lacking on the following aspects which must be provided in the Environmental Statement: scale of the devices; footprint on the seabed; type of devices; type of turbines; description of the wave devices; operational and maintenance activities; monitoring activities such as any pre-deployment grab sampling; and decommissioning – it is unclear what the decommissioning phase will consist of.	The nature, scale, footprint, type of devices, and a description of operation and maintenance and decommissioning activities are described within this chapter (chapter 2: Project Description). Appendix 2.1 summarises the types of wave and tidal devices. Proposed monitoring activities are described in chapter 2: Project Description, and in the draft Environmental Mitigation and Monitoring Plan (EMMP).
28 March 2019	NRW Scoping Opinion	There appears to be limited description of device types. Requires more detail to understand the potential impacts to marine mammals.	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	Table 2.1 for example for Warrior Way describes device types. But information is lacking on what type of turbines are they – e.g. horizontal axis, venture turbine, kite – there is no description of this	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	Tables 2.4 and 2.7. – similarly, inadequate description of the wave devices – it describes the dimensions but no description of what types of devices they will be.	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	For all three phase 2 test areas the frequency of deployment and retrieval operations in a 12-month period has been identified as up to 20 test deployments and retrieval operations in a 12-month period. In addition, the proposed project duration has been identified as 25 years.	Updates to chapter 2: Project Description have been made to clarify this. In addition, the consented period of the project has been reduced to 15 years.
28 March 2019	NRW Scoping Opinion	Section 1.3.1.2 Evidence Report dated 15 March 2019 details that the maximum number of devices that may be tested concurrently at Warrior Way and Dale Road has been reduced from two (as was stated in the Scoping Report) to a single device. However, in East Pickard Bay it is stated that up to two activity tests could be occurring concurrently; the indicative footprint in Fig 2.1 shows a single area of 10,250m2. Clarification must be provided in the ES as to whether both devices would be in the same footprint area or located further apart if this occurred. Habitat evidence for all areas likely to be impacted must be presented in the Environmental Statement.	This is clarified in chapter 2: Project Description (Table 2.8~~Table 2.8~~), and an assessment of potential footprint of device deployments at East Pickard Bay (site 8) is presented in chapter 7: Benthic Subtidal and Intertidal Ecology.
28 March 2019	NRW Scoping Opinion	Because of the number of potential deployments and the size of the test areas we have to assume that a device with the maximum seabed footprint could be deployed anywhere within the mapped test area which could result in 20 different deployment locations over a year, multiplied over 25 years. This has implications when considering impacts to designated habitat features of Pembrokeshire Marine SAC. This is of particular importance for the Warrior Way and Dale Road test sites which fall within a number of Annex 1 habitat features including Estuaries, Large Shallow Inlets and Bays and potentially subtidal Reefs (further site-specific details provided below).	The assumptions made on number of deployments are not correct and updates have been made to chapter 2: Project Description have been made to clarify this and to aid assessment of overall impact.

28 March 2019	NRW Scoping Opinion	We consider a more realistic scenario for Warrior Way and Dale Roads would be to define an area within the wider test area, no bigger than the maximum footprint of two devices and moorings plus a buffer, that can be utilised only for devices requiring seabed deployments of any kind. For other test deployments from floating platforms, vessels or existing moorings the wider test area can be utilised.	This amendment has not been made as potential developers require flexibility in deployment location options within each test site. However amendments have been made to chapter 2: Project Description to minimise seabed footprint at Warrior Way (site 6) and Dale Roads (site 7) (Table 2.2~~Table 2.2~~, Table 2.5~~Table 2.5~~).
28 March 2019	NRW Scoping Opinion	In order to determine the most suitable location within the wider test area we recommend that multi-beam bathymetric surveys are conducted for each test area. This will allow identification of the broader habitats and help target areas where drop down video can be used to ground truth this information. 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. NRW advises the use of Marlin's habitat sensitivity assessments for this purpose. We anticipate that by identifying smaller seabed deployment zones in the wider area we will limit the amount of impact to the sensitive Annex 1 habitats in the Milford Haven Waterway whilst also reducing the survey extent for the applicant.	Multi-beam data identified as available via SEACAMS. An Environmental Management Plan (EMP) and Environmental Mitigation and Monitoring Plan (EMMP) will identify use of the data to inform future survey and monitoring requirements. These plans will be agreed with the consenting authorities during the post-submission phase and are provided as draft plans as part of the META project licence applications submission.
28 March 2019	NRW Scoping Opinion	Some of the terminology used in the description of the PDE has not been described sufficiently. For example, “surface piercing structures” or “sub-surface testing” have not been explained further. It is also not clear what “pre-prepared foundations” are and what the potential impacts of using these would be. We would expect the EIA to include more information in order to be able to correctly assess the potential environmental impact	Chapter 2: Project Description has been updated (para 2.5.2.4) to provide further explanation of surface piercing or sub-surface devices. Appendix of technology types has been provided as Appendix 2.1.
28 March 2019	NRW Scoping Opinion	The Warrior Way and Dale Roads test area include potential energy generation and grid emulation systems but no “installation of permanent infrastructure”. Further information should be provided in the EIA on this aspect, including what potential environmental impacts could arise from any temporary infrastructure.	Reference to temporary/ancillary infrastructure has been removed from Warrior Way (site 6) and Dale Roads (site 7).
28 March 2019	NRW Scoping Opinion	It would have been useful for the applicant to provide examples of the kind of scaled devices that could be deployed here. We suggest that to support the EIA more information is provided on likely device types and deployment methods.	An Appendix of device types is provided as Appendix 2.1 to chapter 2: Project Description.
28 March 2019	NRW Scoping Opinion	Figure 2.1. shows the proposed test area lying over the SSSI boundary for the Milford Haven Waterway SSSI. Subsequent Evidence report dated 15 March 2019 detailed that the Warrior Way site boundary has been refined and figure 1-2 shows the proposed test area adjacent to the SSSI. Impacts on the SSSI features must be considered within the EIA.	Following updates to Warrior Way (site 6) to remove overlap with reef habitat there is no overlap with the Milford Haven Waterway SSSI. Assessment of potential impacts on the SSSI qualifying interest features are outlined in chapter 7: Benthic Subtidal and Intertidal Ecology, chapter 10: chapter 9: Marine Mammals, Basking Shark and Otters, and chapter 10: Marine Ornithology.
28 March 2019	NRW Scoping Opinion	Table 2-1 Provides further detail on the testing activity characteristics of Warrior Way. From the details provided it is difficult to envisage the scale of the maximum scenario provided. For example, the maximum dimensions stated of 25m x 15m (375 m²) do not equate to either the sea area per device/component or the seabed footprint per device (both ≤ 200 m²). This therefore raises the question of what dimension the applicant is referring to.	Dimensions amended to 20 x 10 m at Warrior Way (site 6) to clarify this. No increase in sea-surface area.

28 March 2019	NRW Scoping Opinion	It is also stated that a buffer area of seabed clearance of a 5m strip around the device footprint may be required. We consider this to be an unnecessary component to the PDE and request clarification of why this would be needed? Any clearance of the seabed will widen the benthic footprint of the project and result in unnecessary impact on sensitive habitats. 2.14. Table 2-1 - It is stated that a buffer area of seabed clearance of a 5m strip around the device footprint may be required. The Environmental Statement must provide clarification of why this would be needed. Any clearance of the seabed will widen the benthic footprint of the project and result in greater impact on seabed habitats.	5 m strip of seabed prep around the device footprint has been allowed for potential clearance required for device or scour protection. This requirement and has been assessed fully in the benthic impact assessment presented in chapter 7: Benthic Subtidal and Intertidal Ecology.
28 March 2019	NRW Scoping Opinion	In addition, the maximum scenario for the mooring attachment method states that a gravity base may be required at Warrior Way with a maximum area of 25 m². Again, this does not relate to the maximum footprint described. This must be clarified in the Environmental Statement.	Devices deployed may not require solely gravity bases and may require seabed footprint in addition to a gravity base or mooring spread. This is to allow flexibility of device types/design.
28 March 2019	NRW Scoping Opinion	Table 2-4: The potential use of pin piles has been included in the maximum scenario for Dale Roads. The installation of pin piles will need to be considered further in the EIA particularly regarding the construction noise levels and decommission and removal of the piles following cessation of the project.	This has been considered fully in the relevant technical chapters
28 March 2019	NRW Scoping Opinion	In relation to the overall project footprint, Table 2-4 indicates that under a maximum scenario, device footprints for two deployments is 4,800 m2 with associated buffer areas, mooring/attachments and mooring spread this equates to 160,000 m2. As discussed in the general comments above this could occur up to 20 times in a 12-month period, and for the gravity base, up to 12 months, as described in Table 2-6. We suggest that the applicant ensures that full consideration is made to the benthic footprint of the proposed deployments over the life time of the project given the presence of Annex 1 habitats at this site.	Updates have been made to maximum and most likely device footprints at Dale Roads (site 7) (Table 2.5~~Table 2.5~~)
28 March 2019	NRW Scoping Opinion	From the details provided it is difficult to determine the reasoning behind the inclusion of rock blasting in the PDE. There is limited information regarding this aspect of the project and therefore we request that the rationale and detail of this is expanded on further in the EIA. For example, is the rock blasting included in the project footprint?	This is a mis-understanding. No rock blasting is required or listed in the scoping report. Rock ballasting is listed and is explained in the PDE.
28 March 2019	PCC Scoping response	The proposals adequately describe the potential test areas but not the specific developments as the technologies are unknown. It is unclear how the Scoping Report can ever fully describe the proposals as it is not possible to predict what will be tested.	No action possible
22 July 2019	NRW ML validation	Application requires a definition to describe the difference between a micro tidal device and a scale tidal device. It is unclear to what is meant by swept area which is detailed in table 2.2 and Section 2.5.3.21 details that there would be component testing for floating offshore wind technology, can you clarify what is meant by component testing	A micro-tidal device is a full-scale tidal device but of a small size. A scaled tidal device is a scaled version of a full-scale tidal device. Definitions have been provided in the Glossary. Cross-sectional area that tidal turbine blades/rotor will sweep when it is rotating – i.e. a circular area the diameter of the turbine blades/rotor. A definition has been provided in the Glossary Floating wind technology component testing includes testing of floating wind

				balance of plant, likely to be associated with a semi-submersible platform. No testing of the tower or wind turbine would be involved. A definition has been provided in the Glossary.
22 2019	July	NRW ML validation	Table 2.1 details; Devices deployed may not require solely gravity bases and may require seabed footprint in addition to a gravity base or mooring spread. This is to allow flexibility of device types/design. Considering this are you able to clarify whether the 500m2 footprint for a gravity/mooring in table 2.5 is in addition to the 600m2 device footprint or is it part of the total 600m2 device footprint.	The 500 m^2 would be part of/incorporated within the total 600 m^2 device footprint.
22 2019	July	NRW ML validation	Table 2.3 details that there will be less than 20 deployment and retrieval movements in a 12-month period. However, table 2.4 states that there will be a maximum of 4 testing activities in a 12 month period. It should be made clear whether table 2.3 refers to deployment and retrieval only and the devices will not be in operation, while table 2.4 details devices that will be tested operationally. Or if the 20 deployments and retrievals are in reference the number of times you may choose to deploy and retrieve the device during operational testing.	Paragraph 2.5.2.6 states "Devices may be deployed and retrieved over the lifespan of the project (15 years) at the three META project sites, and the operation and maintenance phase may also occur over the lifespan of the project. Deployment and retrieval of specific devices may therefore overlap with operation and maintenance phases of other project-specific devices." Table 2.3 states that there may be up to and including 20 "deployment and retrieval vessel support operations in a 12-month period". This therefore relates only to vessel movements and not devices. Table 2.4 relates to the O&M phase. There may be up to four tests at Warrior Way (Site 6) in a 12-month period. This relates to devices not vessels.
22 2019	July	NRW ML validation	In addition, further detail is required to describe the extent of work that deployment and retrieval would consist of as no proposed method of works have been provided.	This would usually be provided in a project-specific construction/installation method statement post-consent and up to 6-months prior to works commencing. In the case of META, this will be provided in DIOMS and RAMS which device-developers wishing to test at META will provide. These will be provided to the relevant statutory stakeholders and consenting authorities prior to device-specific works occurring at the META project (sites 6 – 8). The procedure for providing this information to statutory stakeholders and consenting authorities is detailed in the META EMP.
22 2019	July	NRW ML validation	Table 2.2 details that a maximum device that can be supported is 1, if a device had been deployed and was operating for up to 6 months would I be correct to assume that no testing or deployment and retrieval for another non-operational device is being proposed during this period. If this assumption is not correct can you clarify how many devices may be deployed at the same time and confirm that the impact assessment has considered the combined potential impact.	Table 2.2 relates only to Warrior Way (site 6). No testing or deployment and retrieval for another device would be undertaken during this period.
22 2019	July	NRW ML validation	I note that table 2.4 details there may be up to 104 vessel movements during the testing of an operational device. During this period when the device is being tested could the device be removed and redeposited, if so would this be in the same footprint as initially deposited, would any deposit and recovery be within the total number referred to in table 2.3 or would any deployment and recovery related to an operational device be in addition to this.	It is not proposed that a device could be removed and re-deposited in this period, however additional/different devices may be deployed. The up to an including 104 vessel movements listed in Table 2.4 is in relation to the test site (Warrior Way (Site 6) in this case) and is the allowance for all vessel movements at that site relating to O&M in a 12- month period – not per test. Therefore if 2 devices were to be deployed at Warrior Way (Site 6) in a 12-month period, the 104 vessel movements assigned to O&M activities would have to be shared between these tests.
22 2019	July	NRW ML validation	In reference to East Pickard Bay (Site 8) please could further explanation be included in reference to "Seabed footprint (where devices or component touches the seabed) for multiple activity testing" which is detailed in table	8,000 m^2 seabed footprint is specific to a particular device. The maximum scenario for seabed footprint for multiple devices is not double 8,000 m^2 to reflect that the maximum scenario footprint at East Pickard Bay (8,000 m^2) is

			2.8 as the seabed footprint for a single device is <8000m2, and although 2 devices are requested the total for multiple activities is less than double a single device.	highly unlikely to be reflected in any other device. Therefore where there are up to two devices deployed at any one time at East Pickard Bay (Site 8), the second device will have a smaller seabed footprint therefore the total deployment area for multiple devices is less than double 8,000 m^2.
22 2019	July	NRW ML validation	I note that scoping opinion section 2.3 details that the project description should include licencing of any monitoring activities being proposed such as grab sampling. The project description and EMMP details that pre-deployment survey may be required however does not detail whether activities such as grab sampling is being proposed. Should you wish for us to consider the ability to carry out grab sampling as part of the application this should be detailed within the application, if this is not carried out there may be a requirement for further licences in future to carry out licensable pre deployment surveys.	Any grab-sampling will be carried out for device-specific testing (i.e. by the developer) and any licensing requirement will be the responsibility of the device-develop and is therefore not included within the META ML application.
09 2019	July	RSPB Consultation	The project will commit to agreeing with NRW a tidal device blade depth condition to reduce the potential impact pathway to little grebe which are shallow divers. Blade depth should be conditioned to be greater than two metres (>2m depth);	A blade depth condition has been agreed and is detailed in Table 2.2~~Table 2.2~~.
09 2019	July	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 both paragraph 2.5.3.10 and the META EMMP.
09 2019	July	RSPB Consultation	At the NRW meeting we discussed the risk of fish and bird ingress of wave devices, and looking to design it out. Following the discussion today, we agreed that this is managed by a condition where the device design and how the risk of bird and fish ingress is minimised is signed off by NRW prior to deployment.	Addressed in Table 2.5~~Table 2.5~~ and Table 2.8~~Table 2.8~~
09 2019	July	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 2.8~~Table 2.8~~ and the META EMMP

2.5 Project Description

2.5.1 Project Design

2.5.1.1 Scaled and full-scale marine energy device testing will be enabled at the META project. Testing will not be grid-connected.

2.5.1.2 Testing activities which will be supported at the META project are:

- Scale wave device testing;
- Scale tidal device testing;
- Full scale wave device testing;
- Micro tidal device testing;
- Testing of remotely operated vehicle (ROV) or other monitoring equipment;
- Site preparation methodologies;
- Installation and decommissioning methodologies;
- Salvage methodologies; and
- Tow, float and mooring solution testing for floating offshore wind balance of plant technology. For example: Floating wind component testing might include testing of a floating wind turbine foundation on a semi-submersible platform. Neither the tower nor the wind turbine would be involved. A floating foundation may have wave energy converters integrated into the structure.

2.5.1.3 Consent will be sought for the META project for a duration of up to 15 years. This consent will be for META marine testing areas only (Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8).

2.5.1.4 The maximum and most likely activity testing scenarios are provided below:

- Maximum Scenario: single activity testing at any one time at Warrior Way (site 6) and Dale Roads (site 7), and up to two testing activities at any one time at East Pickard Bay (site 8); and
- Most Likely Scenario: single activity testing at any one time at Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8).

2.5.1.5 Details of the key design components of the META project are provided in section 2.5.2. Further details of the key parameters of each META project site are provided below in section 2.5.3.

2.5.2 Key Components

2.5.2.1 Key elements of the design for the META project are detailed below.

Access

2.5.2.2 Access to Warrior Way (site 6) and Dale Roads (site 7) will be by vessel from Pembroke Port. Vessels used for deployment, retrieval and operations and maintenance at Warrior Way (site 6) have a maximum length of 35 m, and a maximum draught of 6.8 m. Vessels used for deployment, retrieval and operations and maintenance at Dale Roads (site 7) will have a maximum length of 164 m, and a maximum draught of 6.8 m which is dictated by the maximum vessel length and draught that can be supported at Pembroke Port. Vessels used in installation, operation and maintenance or decommissioning/retrieval at Warrior Way (site 6) will not use dynamic positioning (DP) to maintain position but may be used at Dale Roads (site 7).

2.5.2.3 Access to the East Pickard Bay (site 8) will be from local ports. Vessels accessing this META project site will have a maximum length of 200 m, and a maximum draught of 8 m. This is dictated by the maximum vessel length and draught that can be supported at local ports (Wales). Vessels accessing East Pickard Bay (site 8) may on occasion use DP for maintaining position.

Appearance and Design

2.5.2.4 Testing activities at the META project may include floating surface structures, surface piercing structures, sub-surface testing and/or seabed mounted structures, and devices may yaw according to local current and tidal conditions as well as due to the movement of large vessels in proximity to the META project sites, and therefore devices may experience up to 360° yaw. Surface-piercing structures include those where part of a deployed device may be visible above the sea-surface. The extent of surface-piercing is outlined for each site in Table 2.2~~Table 2.2~~ (Warrior Way (site 6)); Table 2.5~~Table 2.5~~ (Dale Roads (site 7)), and Table 2.8~~Table 2.8~~ (East Pickard Bay (site 8)). Sub-surface devices are those that will be visible above the sea surface. Appendix 2.1 provides details of technology types and example devices that may be deployed at the META project.

2.5.2.5 Devices and navigational markers will be marked/coloured as required by navigational statutory stakeholders (MHPA, Trinity House, Maritime and Coast Guard (MCA)) on a device-specific basis.

2.5.2.6 Devices may be deployed and retrieved over the lifespan of the project (15 years) at the three META project sites, and the operation and maintenance phase may also occur over the lifespan of the project. Deployment and retrieval of specific devices may therefore overlap with operation and maintenance phases of other project-specific devices. Specific detail on deployment and retrieval methodologies will be provided in the Device Installation & Operation Method Statement (DIOMS) and Risk and Method Statement (RAMS) produced for each device-specific deployment as detailed in the Environmental Management Plan (EMP). Any device-redeployment would look to utilise the same seabed footprint as previously deployed on, however if a device is redeployed at a different location then this would be treated as a separate deployment, and the DIOMS and RAMS would be revisited accordingly.

2.5.2.7 The mooring arrangement for floating devices will be carried out in accordance with the MCA and HSE Guidance "Regulatory expectations on moorings for floating wind and marine devices" (HSE, MCA, 2017).

2.5.2.8 Appendix 2.1 describes and illustrates the range of marine energy devices that may be deployed at the META project.

Lighting

2.5.2.9 There will be minimal lighting associated with offshore testing activities at any of the META project sites. Any lighting will be associated with navigational marking (buoys and/or devices themselves).

2.5.2.10 Lighting of navigational marker buoys or devices themselves at the offshore META project sites will be discussed and agreed with the MCA, MHPA and Trinity House on a device-specific basis.

Sustainability

2.5.2.11 Development of marine energy inherently promotes environmental sustainability by utilising renewable natural resources to generate electricity as opposed to non-renewable sources. The META project is therefore an inherently environmentally sustainable project.

2.5.2.12 The Welsh Well-being of Future Generations Act (WBFGA) requires decisions made in Wales to take into account the impact they could have on people for the future. This important piece of legislation requires all public bodies to work towards seven well-being goals and taking into account five ways of working.

2.5.2.13 Marine energy can help Wales deliver a number of these goals:

2.5.2.14 **A prosperous Wales** and **A more equal Wales** – 50-60% of the economic benefit of marine energy is expected to be generated in coastal areas, many with a need for economic regeneration. A thriving marine energy sector could provide skilled jobs and economic growth for coastal areas such as Pembrokeshire. Local supply chains could deliver marine energy technologies to a global market.

2.5.2.15 **A globally responsible Wales** - Marine energy could play a part in an innovative, low carbon society helping to respect the limits of our global environment.

2.5.2.16 **A resilient Wales -** Marine energy can help provide future generations with clean energy resources within healthy functioning ecosystems

2.5.2.17 In addition, the META project incorporates the following sustainability measures which will contribute to the goals of the WBFGA:

- Use of antifoulants or lubricants that are EU/Internationally approved for use in marine environments;
- Reduce, re-use and recycle in relation to any waste material produced; and
- Support from local supply chain where possible and appropriate, to minimise the carbon footprint of META infrastructure production and support requirements.

2.5.2.18 The META project will also contribute to the aims of the Energy Wales: A Low Carbon Transition policy, which aims to create a sustainable, low carbon economy for Wales (Energy Wales, 2012), by supporting the development of low carbon technologies.

Energy Demand

2.5.2.19 Communication and power to support the tests proposed will be provided locally at the META project sites through test support buoys/platforms or inherently built in to the devices themselves as and when necessary, and this will not require the installation of any permanent infrastructure to support the testing. Requirements for ancillary infrastructure will be discussed with the consenting authority on a device-specific basis.

Energy Generation

2.5.2.20 Energy generation may occur during testing at the META project (although noting that the META project test areas will not be grid connected, with electricity generated either being used locally by the device (battery charging, lights etc) or lost through electricity dissipation local to the sites). As generation capacity at each META project site will not exceed 1 MW, a Section 36 consent is not required for the META project

Waste

2.5.2.21 The installation and operation and maintenance of the META project will not give rise to the production of any hazardous waste. As part as environmental management of the META project, any waste that is produced will be following the general good practice principles as set out in the Waste Hierarchy of Prevention, Re-use, Recycle, Other recovery, Disposal (Defra, 2011). This Waste Hierarchy is followed by MHPA, and any waste produced by the META project will be separated and disposed of following these guidelines and in adherence with MHPA waste management procedures.

Use of Natural Resources

2.5.2.22 The testing of marine energy devices, component or subassemblies will utilise natural resources found within the marine environment. The potential impacts of using marine energy at the META project have been assessed in chapters 5 – 16.

Residues and Emissions

2.5.2.23 Details of emissions in relation to underwater noise are set out in chapter 6: Underwater Noise. As set out in this chapter (chapter 2: Project Description), the META project is not likely to give rise to notable heat emissions during its installation, operational and maintenance phases, or decommissioning phases. Developers will provide device-specific EMPs (see META EMP Section 2.8.2 et seq.), which will contain device-specific parameters, including demonstrating that heat dissipation will not be an issue, and therefore this aspect has not been considered further in this Environmental Statement.

Vulnerability to Accidents and Disasters

2.5.2.24 The META project is designed to minimise the potential for accidents and disasters by minimising the marine footprint wherever possible thereby reducing potential interaction with other users and shipping and navigation (see chapter 12: Shipping and Navigation, and chapter 16: Other Users). It minimises the number of vessel transits required for deployment, retrieval, operation and maintenance, so that the potential for near-misses or collisions with other vessels are minimised (see chapter 12: Shipping and Navigation).

Decommissioning

2.5.2.25 Decommissioning of the META project will involve the removal of any META project equipment such as test-support buoys, ADCP devices etc. As these pieces of equipment are likely to be deployed on a device-specific basis, decommissioning (retrieval) may occur throughout the META project consented lifetime (15 years).

2.5.2.26 Decommissioning of devices, moorings and ancillary equipment will occur on a device-specific basis. As devices may be deployed and retrieved throughout the META project consented lifetime (15 years), decommissioning of devices may occur throughout this period. Details of decommissioning/device retrieval are outlined in section 2.5.3 below.

2.5.3 Summary of Key Parameters

2.5.3.1 The following sections, and Table 2.2~~Table 2.2~~ to Table 2.10~~Table 2.10~~ below provide a summary of the key parameters which have formed the basis for the assessment of effects within the technical chapters 5 - 16. Details are provided for each META project site separately, in the order Warrior Way (site 6), Dale Roads (site 7) and East Pickard Bay (site 8).

Warrior Way (site 6)

2.5.3.2 Warrior Way (site 6) will enable testing of:

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

2.5.3.3 The site does not however have the capacity/area to support full-scale tidal devices other than micro full-scale devices (up to 5 m rotor diameter), therefore full-scale tidal device deployment will not be supported at Warrior Way (site 6).

2.5.3.4 The maximum testing scenario at Warrior Way (site 6) is up to one testing activity occurring at any time within the test area.

Device attachment

2.5.3.5 Devices will be towed to site and installed on pre-prepared foundations, moorings, deployed on the seabed, or deployed from a floating platform or test support buoy. MEW will provide an Acoustic Doppler Current Profiler (ADCP) and a test support buoy to support testing activities at Warrior Way (site 6).

2.5.3.6 Test deployments at Warrior Way (site 6) will be demarked by up to four navigational marker buoys which will be of standard design. Consultation with MHPA on navigational marking requirements will be undertaken on a device-specific basis. Buoys will only be deployed when required to demarcate testing activities and will not be deployed for the duration of the META project lifetime.

2.5.3.7 Table 2.2~~Table 2.2~~ below details the maximum and most likely testing characteristics at Warrior Way (site 6).

Table 2.2: Warrior Way (site 6) testing activity characteristics.

Project detail	Maximum scenario	Most likely scenario
Position in water column	Tidal components are likely to occupy all or part of the water-column. There will be a minimum clearance of 2 m between any rotating blades and the sea-surface.	
Dimensions	20 m x 10 m	5 m x 5 m
Rotor Diameter (tidal only)	≤ 5 m	≤ 5 m
Swept area (tidal only)	19.63 m^2	19.63 m^2
Height above surface	< 2 m	minimal/at sea surface.
Number of devices/tests that can be supported	• 1 device/test at any one time (i.e no other testing/deployment/retrieval or other operation for another device/test may be undertaken during this period)	
Sea-surface area per device/component	≤ 200 m^2	≤ 100 m^2
Proportion of devices touching the seabed	50%	50%

Project detail	Maximum scenario	Most likely scenario
Seabed footprint per device/component (where devices or component touches the seabed)	≤ 200 m²	≤ 100 m²
Speed of moving parts	≤ 5 m/s	≤ 2 m/s
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	5 m strip around device seabed footprint.	None required.
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments.	
Mooring/attachment method	Up to 4 drag anchors with associated slack lines, catenary mooring system. Gravity base may be required at Warrior Way (site 6) - maximum area up to 25 m². No pin piling will be carried out at Warrior Way (site 6).	Deployed from vessel or attached to test support buoys.
Mooring spread per test	150 m²	50-75 m²

2.5.3.8 Table 2.3~~Table 2.3~~ presents the maximum and most likely deployment and retrieval characteristics at Warrior Way (site 6).

Table 2.3: Warrior Way (site 6) deployment and retrieval characteristics.

Project detail	Maximum scenario	Most likely scenario
No. vessels utilised in deployment and retrieval operations at any one time (including guard boat if required)	≤ 5	≤ 3
Frequency of deployment and retrieval vessel support operations in a 12-month period (vessel movements only).	≤ 20 test deployments and 20 retrieval vessel movements in a 12-month period. (including redeployments where necessary)	≤ 20 test deployments and 20 retrieval vessel movements in a 12-month period.
Vessel mooring spread for installation and decommissioning activities	150 m²	50-75 m²

2.5.3.9 Table 2.4~~Table 2.4~~ presents the maximum and most likely operation and maintenance activity characteristics at Warrior Way (site 6).

Table 2.4: Warrior Way (site 6) O&M characteristics.

Project detail	Maximum scenario	Most likely scenario
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	6 months (100 %)	3 months (80 %)
Number of testing activities in a 12-month period (devices)	4	2
Frequency of O&M visits	≤ 104 vessel visits in a 12-month period.	≤ 52 vessel visits in a 12-month period.
No. of vessels utilised in O&M at any one time (including guard boat if required)	≤ 5	≤ 3

2.5.3.10 Component and subassembly testing at Warrior Way (site 6) may be throughout the year (will not be seasonally restricted) and will not be restricted to daylight hours. Preferred period of deployment and operational testing at Warrior Way (site 6) will be March – July during which time no pre-deployment surveys for little grebe will be required. If operational testing is planned outside of the March-July period, then two months of pre-deployment surveys for the bird species little grebe will be undertaken (a minimum of four observations). Deployment, retrieval, and maintenance activities will be ~~restricted~~ undertaken during daylight hours wherever possible, night time working will be assessed on a case by case basis in consultation with the Milford Haven Port Authority ~~to daylight hours~~. Operational procedures will be detailed in Risk and Method Statements (RAMs) that will be submitted as supporting documentation to device-specific deployments.

Dale Roads (site 7)

2.5.3.11 Dale Roads (site 7) will enable testing of:

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

2.5.3.12 The maximum testing scenario at Dale Roads (site 7) is up to one test occurring within the test area.

2.5.3.13 MEW will provide an ADCP, a wave buoy or similar technology, and a test support buoy to support testing activities at Dale Roads (site 7). Drilled pin piling may be required to support test deployments at Dale Roads (site 7); further details of pin piling are provided below.

2.5.3.14 A test-support buoy capable of dissipating energy at site will be provided at Dale Roads (site 7) but will not require the installation of any permanent infrastructure.

2.5.3.15 Testing operations at Dale Roads (site 7) will be demarked by up to four navigational marker buoys which will be of standard design. Consultation with MHPA on navigational marking requirements will be undertaken on a device-specific basis. Buoys will only be deployed when required to demarcate testing activities and will not be deployed for the duration of the META project lifetime.

2.5.3.16 Table 2.5~~Table 2.5~~ below details the maximum and most likely testing characteristics at Dale Roads (site 7).

Table 2.5: Dale Roads (site 7) testing activity characteristics.

Project detail	Maximum scenario	Most likely scenario
Position in water column	Wave component testing may occupy a significant proportion of the water column and may include surface-piercing.	
Dimensions	30 m (L) x 20 m (W)	15 m (L) x 10 m (W)

Project detail	Maximum scenario	Most likely scenario
Height above surface	2 m	At sea surface
Number of testing activities	1	1
Sea-surface area per device/component	≤ 200 m²	≤ 100 m²
Proportion of devices touching the seabed	50%	50%
Seabed footprint per device/component (where devices or component touches the seabed)	≤ 600 m²	≤ 150 m²
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	5 m strip around device seabed footprint.	None required.
Pin piles	≤ 4 drilled pin piles per device. Each pin pile up to 100 mm diameter installed to a depth of 10 – 20 m.	No pin pilling required.
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments.	
Mooring/attachment method	Up to 10 drag anchors with associated slack lines, catenary mooring system. Gravity base may be required at Dale Roads (site 7) - maximum area up to 500 m² (within the seabed footprint per device/component) Pin piling (drilled) may be required at Dale Roads (site 7) (see above).	Dynamic tether mooring system or up to 4 standard drag embedment anchors. Gravity base up to 75 m². No pin piling.
Mooring spread per test activity	200 m²	100 m²
Bird and fish ingress to wave devices	• Potential for bird and fish ingress to wave devices will be minimised through device design	

Pin Piling

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

2.5.3.18 Table 2.6~~Table 2.6~~ presents the maximum and most likely deployment and retrieval characteristics at Dale Roads (site 7).

Table 2.6: Dale Roads (site 7) deployment and retrieval characteristics.

Project detail	Maximum scenario	Most likely scenario
No. of vessels utilised in deployment and retrieval operations at any one time, (including guard boat if required)	≤ 5	≤ 3
Frequency of deployment and retrieval vessel support operations in a 12-month period	≤ 20 test deployments and 20 retrieval vessel movements in a 12-month period.	≤ 20 test deployments and 20 retrieval vessel movements in a 12-month period.
Vessel mooring spread for installation and decommissioning activities	200 m²	100 m²

2.5.3.19 Table 2.7~~Table 2.7~~ presents the maximum and most likely operation and maintenance activity characteristics at Dale Roads (site 7).

Table 2.7: Dale Roads (site 7) O&M characteristics.

Project detail	Maximum scenario	Most likely scenario
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	12 months (100 %)	6 months (80 %)
Number of moored/gravity base deployments in a 12-month period	2	1
Frequency of O&M visits	≤ 104 vessel visits in a 12-month period.	≤ 52 vessel visits in a 12-month period weekly.
No. of vessels utilised in O&M at any one time (including guard boat if required)	≤ 5	≤ 3

2.5.3.20 Operational testing at Dale Roads (site 7) may be throughout the year (will not be seasonally restricted) and will not be restricted to daylight hours, ~~however~~ and whilst deployment and retrieval, and maintenance activities will be ~~restricted~~ undertaken during ~~to~~ daylight hours where possible, night time working will be assessed on a case by case basis~~s~~. Operational procedures will be detailed in RAMs that will be submitted as supporting documentation to project specific deployments.

East Pickard Bay (site 8)

2.5.3.21 East Pickard Bay (site 8) will enable:

- Full-scale WEC device testing;
- Scaled WEC device testing; and
- Component testing for floating offshore wind balance of plant technology. For example: Floating wind component testing might include testing of a floating wind turbine foundation on a semi-submersible platform. Neither the tower nor the wind turbine would be involved. A floating foundation may have wave energy converters integrated into the structure.

2.5.3.22 East Pickard Bay (site 8) may support testing of more than one activity or device at any one time. The maximum testing scenario at East Pickard Bay (site 8) is up to two testing activities/device deployments at any one time. The most likely testing scenario is single activity/device deployment testing at any one time.

2.5.3.23 MEW will provide an ADCP, a wave buoy or similar technology, and test support communications buoys to support testing activities at East Pickard Bay (site 8). The test-support buoy will be capable of dissipating energy at site and providing communications to device developers but will not require the installation of any permanent infrastructure.

2.5.3.24 Each test will be marked by up to four navigational marker buoys. Consultation with MCA, Trinity House and MHPA on navigational marking requirements will be undertaken on a device-specific basis. Buoys will only be deployed when required to demarcate testing activities and will not be deployed for the duration of the META project lifetime.

2.5.3.25 Drilled pin piling may be required to support test deployments at East Pickard Bay (site 8), therefore further details of pin piling are provided below.

2.5.3.26 Ongoing resource monitoring will be undertaken at the site using ADCPs and wave buoys (or similar technology) throughout the lifetime of the project (15 years). Relevant consents and permissions for these deployments will be secured separately.

2.5.3.27 Table 2.8~~Table 2.8~~ below details the maximum and most likely testing characteristics at East Pickard Bay (site 8).

Table 2.8: East Pickard Bay (site 8) testing activity characteristics.

Project detail	Maximum scenario	Most likely scenario
Position in water column	Wave device testing may occupy a significant proportion of the water column and may include surface-piercing, at surface and sub-surface components.	
Dimensions	147 m (L) x 230 m (W)[2]	80 m (L) x 17 m (W)
Height above surface	≤ 15 m[3]	Minimal/at sea surface.
Number of devices deployed in a 12-month period at each berth	2	1
Proportion of devices touching the seabed	50%	50%
Seabed footprint per device/component (where devices or component touches the seabed)	≤ 8,000[4] m²	≤ 1,700 m²
Seabed footprint (where devices or component touches the seabed) for multiple activity testing	10,250 m²	N/A
Sea surface area required for testing (m²)	33,810 m²	100 m²
Buffer area of seabed clearance required around testing area (where device or component touches the seabed)	10 m strip around device seabed footprint.	None required.
Pin piles	≤ 4 drilled pin piles per device. Each pin pile up to 100 mm diameter installed to a depth of 10 – 20 m.	No pin pilling required.
Lubricants and antifoulants	Any antifoulants or lubricants used will be EU/Internationally approved for use in marine environments.	
Mooring/Attachment method	Up to 3-point catenary mooring system (120° separation) or up to 10 standard drag embedment anchors. Gravity base may be required at East Pickard Bay (site 8) - maximum area up to 1125 m². Pin piling may be required at East Pickard Bay (site 8) (see above details below).	Dynamic tether mooring system; Up to 4 standard drag embedment anchors. Gravity base up to 1125 m². No pin piling.
Mooring spread per test activity[5]	500 m x 500 m (250,000 m²)	25 x 25 m (625 m²)
Bird and fish ingress to wave devices	Potential bird and fish ingress to wave devices will be minimised through device design	
Total mooring spread for multiple testing activities	500,000 m²	1,250 m²

[2] *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 – see the META EMMP for further detail.

[3] A maximum scenario height of up to 15 m above sea surface will only apply in devices up to a maximum dimension scenario of 60 m length x 60 m width. Where maximum dimensions of a device are over 60 m length x 60 m width, a maximum height of 5 m above sea surface will be applied.

Pin Piling

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

Rock Ballasting

2.5.3.29 Rock ballasting may be required for scour protection/moorings of devices at East Pickard Bay (site 8). Rocks will be contained in bags and will be removed at the end of the testing period, unless leaving in situ is deemed to be lower impact. Each rock bag may contain up to five tonnes of rock and may have a diameter of up to 2 m. For the most likely scenario (dimensions) this would equate to 100 rock bags which is equivalent to 500 tonnes. It is estimated to take up to five days to deploy this volume of rock.

2.5.3.30 Table 2.9~~Table 2.9~~ presents the maximum and most likely deployment and retrieval characteristics at East Pickard Bay (site 8).

Table 2.9: East Pickard Bay (site 8) deployment and retrieval characteristics.

Project detail	Maximum scenario	Most likely scenario
No. of vessels utilised in deployment and retrieval operations at any one time (including guard boat if required)	≤ 5	≤ 3
Frequency of deployment and retrieval vessel support movements in a 12-month period	≤ 40 deployments and 40 retrieval vessel movements in a 12-month period.	≤ 20 deployments and 20 retrieval vessel movements in a 12-month period.

[4] Maximum scenario is based on a single, specific technology. It is considered highly unlikely that any other technology will come forward that is of a similar scale to this technology

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

Project detail	Maximum scenario	Most likely scenario
Mooring spread if required for deployment and retrieval[52]	400 m x 300 m (120,000 m²)	350 m x 200 m (70,000 m²)

2.5.3.31 Table 2.10~~Table 2.10~~ presents the maximum and most likely operation and maintenance activity characteristics at East Pickard Bay (site 8).

Table 2.10: East Pickard Bay (site 8) O&M characteristics.

Project detail	Maximum scenario	Most likely scenario
Duration of tow testing activity (estimated % time device in water given in brackets)	≤ 3 months (50%)	≤ 1 month (50%)
Number of tow tests in a 12-month period	2	1
Moored/gravity base deployment duration (estimated % time device in water given in brackets)	18 months (100%)	6 months (80%)
Number of moored/gravity base deployments per test berth in a 12-month period	2	1
Total number of moored/gravity base deployment at East Pickard Bay (site 8) in a 12-month period	4	1
Frequency of O&M visits	≤ 150 vessel visits in a 12-month period.	≤ 104 vessel visits in a 12-month period.
No. of vessels utilised in O&M at any one time (including guard boat if required)	≤ 5	≤ 3

2.5.3.32 Devices may remain installed at East Pickard Bay (site 8) throughout the year (will not be seasonally restricted) and operation will not be restricted to daylight hours, ~~however~~ and whilst installation, deployment and retrieval, and maintenance activities will be ~~restricted to~~ undertaken during daylight hours where possible, night time working will be assessed on a case by case basis. Operational procedures will be detailed in RAMs that will be submitted as supporting documentation to project specific deployments.

Indicative Phasing of installation of the META Project

2.5.3.33 The installation of marine energy devices and associated ancillary equipment such as test support buoy and aids to navigation, will be on a device-specific basis and may take place throughout the lifespan of the project (15 years). It is anticipated that the first test deployments at META project sites will commence in 2020.

Installation Working Hours

2.5.3.34 Installation and retrieval of marine energy devices at META project sites will ~~be restricted to~~undertaken in daylight hours wherever possible, however night time working will be assessed on a case by case basis in consultation with Milford Haven Port Authority.

2.6 Environmental Management during Construction

2.6.1.1 MEW will develop plans (as summarised below and in detailed in section 2.8) to support environmental management of the META project, as follows:

- Environmental Management Plan (EMP);
- Environmental Mitigation and Monitoring Plan (EMMP);
- Marine Pollution Contingency Plan (MPCP); and
- Invasive Non-Native Species Management Plan (INNSMP).

2.6.1.2 These will form the basis for discussion with the appropriate regulatory authorities and final plans will be submitted for approval by the regulatory authorities during the post-submission/pre-installation phases.

2.6.1.3 Installation works will be undertaken in accordance with the Environmental Management Plan (EMP). The EMP sets out the key management measures that developers and their contractors will be required to adopt and implement whilst testing at the META project (see 2.8.2).

2.6.1.4 This EMP will form the basis of more detailed plans and method statements, including an Environmental Mitigation and Monitoring Plan (EMMP), to be prepared during the pre-installation period for offshore works.

2.6.1.5 The EMP will include planning for accidental spills (Marine Pollution Contingency Plan (MPCP)) and will contain an Invasive Non-native Species Management Plan (INNSMP) (see section 2.8.4 below) to limit the spread of marine invasive non-native species (INNS).

2.6.1.6 The EMMP has been developed to set out the measures identified during the EIA process which may be required to minimise potential impacts on the receiving environmental. These measures include strategies and control measures for managing the potential environmental effects of installation and limiting disturbance from installation activities as far as reasonably practicable.

2.6.1.7 The Invasive Non-Native Species Management Plan (INNSMP) will outline the measures required to minimise the risk of introduction of invasive species to the META project and adjacent waters.

2.6.1.8 Developers and their contractors will be required to adhere to the EMP, EMMP, INNSMP, and MCMP.

2.6.2 Installation Working Areas

2.6.2.1 No installation working areas are included in the META project design envelope and are therefore not included in this assessment.

2.6.3 Installation Access

2.6.3.1 Installation of test devices will be by vessel from port and will not require additional use of the terrestrial road network.

2.6.4 Installation Vehicles

2.6.4.1 Marine energy device installation vessels will be required. Vessels likely to be used for installation of marine energy devices at META project sites will have a maximum length of 35 m and 6.8 m draft at Warrior Way (site 6), 164 m length and a maximum draught of 6.8 m at Dale Roads (site 7) and 200 m length and 8 m draught at East Pickard Bay (site 8).

2.7 Operation and Maintenance

2.7.1.1 Pembrokeshire Coastal Forum (PCF), the organisation behind the development and operation of the META project in the Waterway aim to instigate a rigorous application, deployment and operation process to ensure a high standard of Quality, Health, Safety and Environmental Management (QHSE).

2.7.1.2 The users of META sites will be required to follow a number of Standard Operating Procedures and Emergency Operating Procedures that cover processes required to safely operate both in the inherently dangerous marine environment but also within a busy operational port environment. This will include compliance with all procedures put in place by the relevant authorities such as Maritime and Coastguard Agency (MCA); Trinity House, and the Port of Milford Haven (PoMH), to ensure safe and responsible marine operations. MEW is committed to ensuring that all activities taking place within the test areas are carried out with due regard to the affect that they may have on the environment, workplace safety, access, egress and welfare against up to date regulations.

2.7.1.3 All developers utilising the META sites will be required to be fully compliant with their responsibilities as defined by:

- The Health & Safety at Work Act (1974);
- The Marine and Coastal Access Act (2009)
- Construction (Design and Management) Regulations 2015and
- All other appropriate legislation in force at the time of their deployment.

2.7.1.4 MEW, their technical advisors, and key regulators and statutory stakeholders, will determine applications to test at the META project, depending on compliance with the above Operation and Maintenance requirements, and a technical appraisal of the proposed technology and installation methodology against. The technical appraisal will include consideration of the following:

- Compliance with the parameters as set-out in chapter 2: Project Description;
- Compliance with the Marine Licence, Marine Works Licence and Planning consents and any associated conditions;
- Any specific lease or partner requirements as specified by regulatory authorities;
- Good practice in accordance with stakeholder expectation; and
- Due diligence of prospective customers covering financial status, insurance, and any financial bonds.

2.7.1.5 To support device testing at META project sites, device developers will be expected to submit a device-specific EMP which will include the following documentation:

- META project testing Application Form;
- General Overview of their proposed testing;
- Engineering assessment and general arrangement drawing;
- Independent validation of the mooring design;
- Quality, Health, Safety and Environment (QHSE) management plan;
- Project execution plan;
- Device-specific decommissioning plan;
- Emergency response plan;
- Seabed habitat risk assessment'
- Environmental risk assessment;
- Insurances; and
- Security bonds.

2.7.1.6 Device developers will also prepare a Device Installation and Operation Method Statement (DIOMS) for each device deployment. These will include detailed methodologies for device installation and device operation programme of works, including number and frequency of vessel movements, types of vessels to be utilised, duration of works and equipment to be utilised.

2.8 Measures Adopted as Part of the Project

2.8.1.1 In order to avoid or reduce the environmental effects, a number of measures have been designed into the project. Details of these can be found within each topic chapter of the Environmental Statement and are summarised below.

2.8.2 Environmental Management Plan (EMP)

2.8.2.1 This will be a precise, pragmatic document that sets out the environmental framework within which the project will be delivered, covering consents and legislative requirements, roles and responsibilities, lines of communication and reporting, competence, training and awareness, monitoring and audits, in addition to project mitigation/monitoring measures and commitments. It will draw on relevant guidance including the Institute of Environmental Management and Assessment (IEMA, 2008) guidance on Environmental Management Plans, and experience of producing EMPs for offshore projects. Consent obligations will be captured where these can be readily implemented through the delivery of the plan. Depending on specific marine licence conditions, the plan will include:

- Communication and reporting procedures;
- Roles and Responsibilities;
- Training and competence;

- Monitoring and auditing procedures;
- Invasive non-native species management plan;
- MPCP which clearly sets out response procedures in the unlikely event of a spill, including the communications and reporting procedures in the event of an oil or chemical spill, checklists, and reporting proformas, a risk assessment and environmental sensitivity map, and background on oil spill dispersion;
- Chemical Risk Assessment;
- Protected species and habitats management plans;
- Fisheries Liaison Plan;
- Vessel Management Plan; and
- Environmental Liaison Plan.

2.8.2.2 Operation of META will comply with MHPA waste management procedures as outlined in paragraph 2.5.2.21, therefore a META specific waste management procedure is not deemed necessary and has not been provided here.

2.8.3 Environmental Mitigation and Monitoring Plan (EMMP)

2.8.3.1 This plan will outline the post-consent monitoring requirements for marine renewables devices at the META project and may include requirements for pre-installation baseline surveys and post-deployment monitoring of operational devices. This document will also detail any mitigation measures that device developers may be expected to adopt which will prevent significant adverse impacts to environmental receptors, as identified in the Environmental Statement.

2.8.3.2 The EMMP will outline the monitoring objectives, methodologies and timings for each receptor group, and demonstrate how the surveys will enable validation of Environmental Statement predictions or how it will address residual uncertainties identified in the Environmental Statement.

2.8.3.3 The EMMP will detail survey, monitoring and/or mitigation requirements for each META site and for each receptor group, based on the predictions made in the Environmental Statement.

2.8.3.4 An outline monitoring reporting document will be developed which will clearly show how the requirements of any monitoring conditions have been met, including presenting the pre-construction positions (including any limitations), and it will clearly outline the purpose of any subsequent comparisons which may be made in relation to specific devices. Reports will be used to inform relevant regulatory bodies and statutory stakeholders.

2.8.4 Invasive Non-native Species Management Plan

2.8.4.1 This plan will set out the prevention and control measures to be implemented by developers and their contractors at the META project sites to minimise the risk of introducing invasive species. It will also outline measures to be taken to ensure invasive species do not become established at the META project sites should they be introduced, and details of monitoring proposed with regard to invasive species in the marine environment. This plan will form part of the over-arching EMP (Section 2.8.2).

2.9 Strategic Environmental Monitoring

2.9.1.1 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.

2.9.1.2 MEW may undertake survey and monitoring of relevant ecological receptor groups in order to inform testing (and potential deployment-specific monitoring requirements) at the META project by device developers, and industry-wide understanding of potential impacts on ecological receptors of marine energy devices. Where strategic survey/monitoring is appropriate, MEW would look to a collaborative effort between the META project, wider industry, academia, regulators and stakeholders to take this forward in the most efficient way for the interest of the META project and future projects elsewhere in Wales and the UK. MEW will seek to agree strategic survey and monitoring priorities with industry and statutory stakeholders and will work with regulators and their advisory bodies to agree the details of appropriate monitoring and will ensure that any survey and monitoring programme is aligned with industry best practice. MEW will seek to work with ORJIP Ocean Energy which is a UK-wide collaborative programme of environmental research which aims to reduce consenting risks for wave, tidal and tidal range projects, to propose appropriate survey and monitoring at META project sites, proportionate to the scale of potential impact.

2.10 References

Department for Environment, Food and Rural Affairs (DEFRA) (2011). Guidance on applying the Waste Hierarchy, June 2011.

Health and Safety Executive (HSE) and Maritime & Coastguard Agency (MCA) (2017). Regulatory expectations on moorings for floating wind and marine devices, August 2017.

Institute of Environmental Management and Assessment (IEMA) (2008) Environmental Management Plans, Best Practice Series, Volume 12, December 2008.

Natural Resources Wales (NRW) (2017). Scoping an Environmental Impact Assessment for Marine Developments – Guidance for developers and NRW staff, August 2017 (as reviewed January 2018).