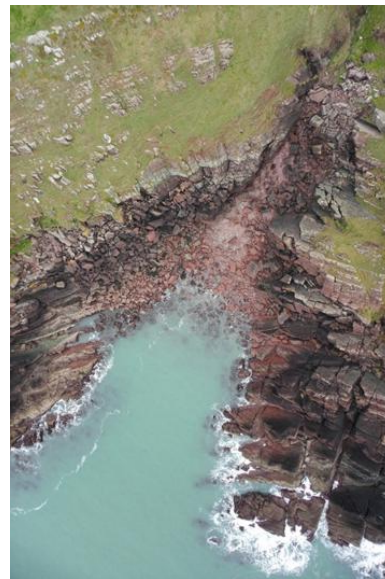




mWave Marine Energy Device and Onshore Infrastructure

ENVIRONMENTAL STATEMENT



June 2019

CHAPTER 4: Environmental Assessment Methodology

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Glossary

Term	Definition
Annex II protected species	Endangered, vulnerable, rare and/or endemic species which are listed under Annex II of the Habitats Directive. Core areas of the species' habitat must be protected under the Natura 2000 Network and the sites managed in accordance with the ecological requirements of the species.
Habitats Directive	The Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive, is the means by which the European Union meets its obligations under the Bern Convention. The Directive applies to the UK and to its Overseas Territory of Gibraltar.
The META project	The META project, located in Pembrokeshire, consists of eight test sites where marine energy testing activities will be permitted. The licensing and consenting of the mWave project was originally intended to be undertaken within the consenting and licensing of the META project, with mWave being deployed within META Site 8.

Acronyms

Acronym	Description
BAP	Biodiversity Action Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
DETR	Department of the Environment, Transport and the Regions
DMRB	Design Manual for Roads and Bridges
ES	Environmental Statement
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMMP	Environmental Mitigation and Monitoring Plan
GHG	Green House Gases
IEMA	Institute for Environmental Management and Assessment
MCA	Maritime and Coastguard Agency
META	Marine Energy Test Area
MEW	Marine Energy Wales
MHPA	Milford Haven Port Authority
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MOD	Ministry of Defence
NRWa	Natural Resources Wales Advisory
NRW- PS	Natural Resources Wales Permitting Services
PCNPA	Pembrokeshire Coast National Park Authority
PDM	Pembroke Dock Marine
RNLI	Royal National Lifeboat Institute

Acronym	Description
SAC	Special Area of Conservation
SPA	Special Protected Area
UK	United Kingdom
VER	Valued Ecological Receptor
WFA-CPC	Welsh Fishermen's Association - Cymdeithas Pysgotwyr Cymru

4. ENVIRONMENTAL ASSESSMENT METHODOLOGY

4.1 Introduction

4.1.1.1 This chapter of the Environmental Statement sets out the approach taken for the Environmental Impact Assessment (EIA) of the mWave project. The chapter also includes details of the consultation undertaken to date and the overall approach to the assessment of the likely effects of the mWave project. Further details of topic specific methodologies, such as survey methods or assessment of significance, where this differs from that set out in this chapter, are provided in each topic chapter (chapters 5 - 17) of this Environmental Statement.

4.2 Purpose of this chapter

4.2.1.1 The primary purpose of the Environmental Statement is to support the marine consent and planning application for the mWave project, which are outlined in chapter 2: Project Description.

4.2.1.2 In particular, it is intended that this Environmental Statement chapter presents:

- the assessment methodology used to determine potential impacts on receptors, including outlining the assessment of magnitude of impact, sensitivity of receptors and the significance of effect;
- the methodology used for Cumulative Impact Assessment (CIA); and
- the methodology used for inter-related and transboundary assessment.

4.3 Background

4.3.1 Scoping

4.3.1.1 Scoping is the process of identifying the issues to be addressed during the EIA process. Though not a statutory requirement, scoping is a very useful preliminary procedure, which sets the context for the EIA process.

4.3.1.2 Regulation 13 of the Marine Works (EIA Regulations) 2007 (as amended, 2017) and Regulation 14 of the Town and Country Planning (EIA) (Wales) Regulations 2017 allows an applicant to request that the competent authority sets out its opinion (known as a Scoping Opinion) as to the issues to be addressed in the Environmental Statement.

4.3.1.3 As discussed in Chapter 1, Introduction, the licensing and consenting of the mWave project was originally intended to be undertaken within the consenting and licensing of the META project, which included META site 8 (East Pickard Bay, with mWave being located at the eastern end), which was being progressed by Marine Energy Wales (MEW). Prior to the decision to progress separate permissions for mWave, detailed consultation on the META project, including the cable landfall at East Pickard Bay had been undertaken. A Scoping Report and request for a Scoping Opinion was submitted to the following regulatory authorities (16 November 2018):

- Natural Resources Wales Permitting Services (NRW-PS);
- Marine Management Organisation (MMO);
- Milford Haven Port Authority (MHPA); and
- Pembrokeshire Coast National Park Authority (PCNPA).

4.3.1.4 The proposed scope of the assessment was informed by the nature and scale of the proposed META development and its location, as outlined below and, whilst mWave is now a separate project of short duration and limited scale, consultee feedback is of value when taken in context:

- Marine Energy Wales (MEW) proposed the META project as 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; and
- The META project will support developer testing of marine energy components and marine renewable devices. These will be undertaken in a wide range of environmental conditions, including sheltered marine environments as well as larger full-scale marine testing areas. Site 8 East Pickard Bay is one of the three META sites for which a scoping opinion was sought. Specific to mWave, a marine cable route corridor from META Site 8 to a landfall at East Pickard Bay and four potential sites for an onshore control station with associated onshore cable routes were also included in the scoping report.

4.3.1.5 A Scoping Opinion was provided by Natural Resources Wales – Permitting Services, and the Marine Management Organisation (MMO) on the 28 March 2019 (NRW ref: SC1817; MMO ref: EIA/2018/00059). The following consultees/ organisations responded as part of the Marine Licence scoping consultation process:

- Department for Business, Energy & Industrial Strategy (BEIS)
- Dyfed Archaeological Trust (DAT)
- Maritime and Coastguard Agency (MCA);
- National Air Traffic Services (NATS Safeguarding);
- NRW – PS (ABPmer provided advice on underwater noise);
- NRW – Advisory;
- Pembrokeshire County Council (PCC);
- Royal Society for the Protection of Birds (RSPB);
- Royal Yachting Association (RYA);
- Trinity House;

- UK Chamber of Shipping; and
- Welsh Government

4.3.1.6 A scoping opinion was also provided by Pembrokeshire Coast National Park Authority on 18 January 2019 Ref NP/18/0699/SCO, regarding the communication cable and four proposed site options for onshore works. The following consultees/ organisations responded as part of the scoping consultation process:

- Dyfed Archaeological Trust (DAT)
- NRW – Advisory;
- PCNPA Planning Ecologist
- Highways Authority.

4.3.1.7 Where relevant the Environmental Statement topic chapters provide a summary of the key points raised during consultation with both statutory and non-statutory consultees and the points raised through the Scoping Consultation process relevant to each chapter.

4.3.1.8 The scoping exercise highlighted a number of areas that consultees wished to see addressed within the META Environmental Statement, some of which are relevant to mWave. Taking into account the information provided within the Scoping Opinion and other consultation responses provided throughout the EIA process, the following topics have been identified as requiring consideration within this Environmental Statement:

- Coastal processes;
- Benthic subtidal and intertidal ecology;
- Fish and shellfish ecology;
- Marine mammals;
- Marine ornithology;
- Underwater noise;
- Commercial fisheries;
- Shipping and navigation;
- Marine archaeology;
- Seascape and landscape;
- Other users;
- Onshore geology, Hydrology and Land Quality;
- Onshore noise; and
- Terrestrial ecology.

4.3.1.9 An archaeological desk based assessment has been prepared for the onshore works. This report will be provided in support of the onshore planning application.

4.3.2 Consultation

4.3.2.1 A summary of the key issues raised during consultation relating to chapter 4: Environmental Assessment Methodology are outlined in Table 4.1, together with how these issues have been considered in the production of this Environmental Statement chapter.

4.3.2.2 In addition to the organisations listed in Table 4.1, MEW also held meetings to develop links with relevant regulatory authorities, fisheries interests, Ministry of Defence (MOD), navigational interests, public interest groups and device developers. Bombora was also involved in some of these meetings.

Table 4.1: Summary of key issues raised during consultation for the META project relevant to the mWave environmental assessment methodology.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
10 January 2019	NRW Advisory	Advice on benthic ecology baseline and assessment approach. Advice on potential changes to site boundaries to reduce concern over potential impacts on Annex 1 habitat – 'Reef'.	Bathymetric survey of the mWave deployment site and surrounding area (Titan 2018) confirmed that the mWave will not be positioned on Annex I reef habitat (Chapter 7 Benthic Subtidal and Intertidal Ecology chapter technical assessment).
10 January 2019	NRW Advisory	Survey of cable route at East Pickard Bay should cover cable route through reef habitat and no surveys needed of cable route through sandy habitat within East Pickard Bay (site 8)	Drop down camera survey of the mWave cable route was undertaken in March 2019 (Aquatic Survey and Monitoring Ltd 2019). The survey has confirmed that no species or features of notable marine nature, none of the habitats and species seen were considered especially vulnerable or sensitive to the expected physical effects of the cable deployment, presence or retrieval. (chapter 7: Benthic Subtidal and Intertidal Ecology).
	RSPB	Regard should also be had to Natural Resources Wales' emerging Area Statements (Marine and South West Wales Areas).	It is thought that the Area Statements referred to are not finalised and not available for use in the Impact Assessment for the project. Reference has therefore not been made to these Area Statements within the Environmental Statement.
01 April 2019	NRW – Scoping Opinion	The Cumulative Impact Assessment (CIA) must as a minimum consider the cumulative effects of META phase 2 with: • META phase 1; • Dredging activities; • Disposal activities • Egnedol Wales Ltd 350MW land based green energy scheme • Draft Welsh National Marine Plan (dWNMP)	The CIA projects considered in this Environmental Statement are outlined in Table 4.6 and Figure 4.1. The projects listed have been considered in the CIA. In terms of the dWNMP Chapter 3: Need and Alternatives outlines how the mWave project complies with the dWNMP.
28 March 2019	NRW – Scoping Opinion	The following data sources may provide useful information for the assessment of cumulative effects: • Marine Licence applications:	The data sources provided have been utilised in undertaking the CIA.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
		http://lle.gov.wales/catalogue/item/MarineLicences/?lang=en - The Nationally Significant Infrastructure Projects register: https://infrastructure.planninginspectorate.gov.uk/projects/register-of-applications/ - The Developments of National Significance Register: http://gov.wales/docs/desh/publications/180312-dns-register-en.pdf - Planning Policy e.g. Local Development Plans, Transport Plans (National and Local) and National Policy Statements.	
28 March 2019	NRW – Scoping Opinion	The ES must include: - A description of the likely significant effects of the project, whether direct, indirect, secondary, cumulative, transboundary, short-term, medium-term, long-term, permanent, temporary, positive and negative. - A description of the methods used to make the assessment of the significant effects and difficulties encountered in compiling the information, and uncertainties involved. - A description of measures to avoid, prevent, reduce or offset identified significant adverse effects, and proposed monitoring arrangements. - A description of the expected significant adverse effects of the project on the environment resulting from the vulnerability of the project to risks of major accidents or disasters	This chapter (chapter 4: Environmental Assessment Methodology) outlines the approach taken to impact assessment (section 4.4) This approach has been applied across the technical chapters, and amended where appropriate to the technical assessment. The parameters listed have been considered in the assessment methodology. A description of the methods used in the assessment is outlined in section 4.4. Each technical chapter (chapters 5 – 17) describe any limitations or difficulties encountered when compiling the information in each technical assessment. Each technical chapter (chapters 5-17) describes the measures taken to avoid, prevent, reduce or offset identified significant adverse effects and outlines any proposed monitoring. Chapter 2: Project Description, section 2.6 summarises the measures which have been embedded in the project. In addition to this an Environmental Management Plan (EMP) incorporating Invasive non-native species risk assessment and Marine Pollution Control Plan measures, and an Environmental Mitigation and Monitoring Plan (EMMP) will be integral to the project. Chapter 2: Project Description, section 2.5.2 describes the vulnerability of the mWave project to accidents and disasters. Chapter 12: Shipping and Navigation, and chapter 15: Other Users, describes measures taken to minimise the potential for accidents or disasters.
28 March 2019	NRW – Scoping Opinion	Where possible, other environmental assessments should be coordinated with the EIA process. However, it is important to note that HRA and WFD (and any other assessment) are separate processes to the EIA.	The WFD assessment and NSER have been undertaken in parallel with the EIA process, and have taken into consideration the conclusions of the Environmental Statement.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
28 March 2019	NRW – Scoping Opinion	The UK is due to leave the EU on 29 March 2019. –Regardless as to whether the UK leaves the EU with a deal or without a deal, all legal obligations relating to compliance with environmental licences/permits and legislation will continue to apply. NRW on behalf of Welsh Ministers will continue to issue licenses in line with our current practice.	The EIA has been undertaken taking into consideration current legislation. The consents and licences that have been considered for the mWave project are outlined in chapter 2: Project Description, and Appendix 3.1.
28 March 2019	NRW – Scoping Opinion	The EIA/ES must consider the potential for impacts on other European States.	Transboundary impacts have been considered in each technical chapter (chapters 5-17). This is outlined in section 4.4 Error! Reference source not found..
28 March 2019	NRW – 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 ES, informed by site-specific monitoring.	Detailed information describing the baseline environment pertinent to each technical assessment is presented in each technical chapter (chapters 5-17).

4.3.3 Legislative/policy context

- 4.3.3.1 The Environmental Statement provides an overview of relevant legislative and/or policy context within each topic chapter. General policy that relates to the mWave project as a whole is summarised in chapter 1: Introduction. The assessment has had regard to national and local policy documents, where relevant.

4.3.4 Climate change

Climate change resilience

- 4.3.4.1 Whilst the deployment and testing of mWave is short term, resilience to future climate change is built into the concept of the mWave project. The aim of the mWave project is to take forward the development of a sustainable Wave Energy Converter which could be used to reduce future reliance on traditional energy sources, thereby reducing the potential for climate change. Resilience to future climate change has also been considered during the site selection process and the route selection for the cabling from East Pickard Bay to Mean High Water Springs (MHWS), through taking into account resilience to extreme weather events.

Changes to future environmental conditions

Consideration of predicted changes in baseline environmental conditions, including changes resulting from climate change, has been set out within each Environmental Statement topic chapter as appropriate (chapters 5 to 17), where relevant information is available at the time of writing. Where appropriate, the assessment of effects for each topic has considered identified trends or changes predicted to arise as a result of climate change.

Effects of the project on climate

- 4.3.4.2 As outlined in paragraph 4.3.4.1, the aim of the mWave project is to take forward the development of a Wave Energy Device to reduce future reliance on traditional energy sources, thereby reducing the potential for climate change. However, mWave alone is expected to have a negligible impact on climate change, and therefore this topic has not been given its own chapter within the Environmental Statement.

4.3.5 Topics scoped out of the EIA process

- 4.3.5.1 The following topics which have been scoped out of the assessment are summarised below.

Climate change

- 4.3.5.2 An assessment of climate change and Green House Gases (GHG) is required under the EIA Regulations where there is potential for likely significant environmental effects. At present there is no single piece of methodological guidance accepted as standard, although the Institute of Environmental Management and Assessment's (IEMA) guidance on GHG emissions states that, '*in principle, any GHG emissions may be considered to be significant, and advocates as good practice that GHG emissions should always be reported at an appropriate, proportionate level of detail in an ES*' (IEMA, 2017).
- 4.3.5.3 Paragraph 4.3.4.2 describes how the mWave project has considered GHG emissions and climate change.

Population and human health

- 4.3.5.4 An assessment of population and human health is required by the 2017 EIA Regulations where there is potential for likely significant effects. Guidance is available from IEMA (Health in Environmental Impact Assessment: A Primer for a Proportionate Approach) (Cave *et al.*, 2017).
- 4.3.5.5 Population and human health has a broad scope and is in practice considered across a range of other topic areas within the Environmental Statement, in particular Seascape, Landscape (chapter 14), and Other Users (chapter 15). The mWave project will facilitate the advancement of a green energy resource in the form of wave energy, potentially leading to less dependency on fossil fuels in the future and thus less pollution adversely affecting the human population. No separate consideration of population and human health is therefore considered necessary and it has been scoped out of the Environmental Statement.

Material assets

- 4.3.5.6 The EIA Regulations refer to 'material assets', including architectural and archaeological heritage. The phrase 'material assets' has a broad scope, which may include assets of human or natural origin, valued for socio-economic or heritage reasons. Material assets are in practice considered across a range of topic areas within the Environmental Statement, in particular, Marine Archaeology (chapter 13) and Other Users (chapter 15). An archaeological desk based assessment has been prepared for the onshore works. This report will be provided in support of the onshore planning application. . These topics are included within this Environmental Statement and therefore no separate consideration of material assets is considered necessary and this topic has therefore been scoped out of the Environmental Statement.

Radiation and heat

- 4.3.5.7 As discussed in Chapter 2 Project Description, Section 2.5.5, Residues and Emissions, no significant radiation or heat effects are anticipated due to the nature and scale of activities being proposed. An assessment of these effects has therefore been scoped out of the Environmental Statement.

Air quality

- 4.3.5.8 Due to the location, duration, scale and nature of activities proposed at the mWave project, there is a low risk of increased air pollution. There will be minimal additional vessel traffic associated with the installation of the marine cable to the landfall at East Pickard Bay, and some increase in vessel activity associated with installation, operation and maintenance, and decommissioning activities associated with the mWave project. Air quality has been scoped out of the Other Users chapter (chapter 15) as follows: *"due to the scale and nature of activities proposed at the mWave project below MHWS, there is a low risk of impact on air pollution. Emissions from vessels associated with the project are anticipated to fall within background levels experienced in the immediate surroundings. This impact has therefore been scoped out of further assessment. In terms of onshore works, there will be short term minimal ground preparation work at the onshore control station and the communication cable will not be buried, but will be laid on the surface. As such the potential for air quality impacts are negligible. Further consideration of this potential impact has therefore been scoped out of the Environmental Statement."*

Flood Risk

- 4.3.5.9 Due to the nature and scale of the mWave project activities, there is considered to be a negligible potential risk of impact on flood risk and therefore further consideration of this potential impact has been scoped out of the Environmental Statement.

4.4 Environmental assessment methodology

4.4.1 Relevant EIA guidance

- 4.4.1.1 The EIA process has considered relevant government or institute guidance, including:
- Welsh Office Circular 11/99: EIA;
 - Department for Communities and Local Government (2014) Planning Practice Guidance at <http://planningguidance.planningportal.gov.uk>;
 - Department of the Environment, Transport and the Regions (DETR) (1997) Mitigation Measures in Environmental Statements;
 - Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2nd Ed.)
 - IEMA (2004) Guidelines for EIA;

- IEMA (2011) The State of EIA Practice in the UK. Special Report;
- IEMA (2015a) EIA: Guide to Shaping Quality Development;
- IEMA (2015b) Climate Change Resilience and Adaptation;
- IEMA (2016) EIA: Guide to Delivering Quality Development;
- IEMA (2017) EIA: Assessing Greenhouse Gas Emissions (GHG) and Evaluating their Significance;
- A Review of Assessment Methodologies for Offshore Wind Farms (COWRIE METH-08-08) (Maclean *et al.*, 2009);
- Offshore Wind Farms: Guidance Note for EIA in Respect of Food and Environment Protection Act 1985 and Coastal Protection Act 1949 requirements (Cefas, 2004);
- Cumulative Impact Assessment (CIA) Guidelines - Guiding Principles for CIA in Offshore Wind Farms (RenewableUK, 2013);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012); and
- Department for Communities and Local Government (2014) Planning Practice Guidance at <http://planningguidance.planningportal.gov.uk>;
- DETR (1997) Mitigation Measures in Environmental Statements. HMSO; and
- Highways Agency *et al.* (2008) Design Manual for Roads and Bridges, Volume 11, Section 2, Part 5. HA 205/08.

- 4.4.1.2 Other topic specific legislation and good practice guidance has been considered and details of these can be found in the topic chapters within this Environmental Statement.

4.4.2 Key elements of the general approach

- 4.4.2.1 The assessment of each environmental topic forms a separate chapter of the Environmental Statement. For each environmental topic, where relevant, the following have been addressed:

- Study area;
- Description of the environmental baseline (including future baseline conditions);
- Limitations of the assessment;
- Key parameters for assessment;
- Measures adopted as part of the project, including mitigation and design measures that form part of the project;
- Impact assessment methodology including assessment criteria;
- Identification of likely effects and evaluation and assessment of the significance of identified effects, considering any measures designed to reduce or avoid environmental effects which form part of the project;
- Identification of any further mitigation or monitoring measures envisaged to avoid, reduce and, if possible, remedy adverse effects; (in addition to those measures that form part of the project);
- Cumulative impacts of the mWave project with other plans or projects within a defined study area;
- Assessment of transboundary effects; and
- Assessment of inter-related effects.

4.4.2.2 As identified in Chapter 1 Introduction, the licensing and consenting of the mWave project was originally intended to be undertaken within the consenting and licensing of the META project, which included site 8 (East Pickard Bay). As such the assessment of mWave and its cable route was included within the project design envelope of the META Environmental Statement. In order to provide consistent information for both projects, which are likely to have their consent applications within the Marine Licence process at the same time, Bombora has used the assessment methodology provided in the META Environmental Statement for the project specific assessment of the marine elements of mWave. Further details of this methodology is given below. Where a subject specific methodology has been used for instance in Geology, Hydrology and Land Quality, details of the methodology are provided in the relevant chapter.

Methodology and assessment criteria

4.4.2.3 Each topic chapter provides details of the methodology for baseline data collection and, where appropriate, provides the approach to the assessment of effects.

4.4.2.4 Each topic chapter defines the scope of the assessment within the methodology section, together with details of the study area, and the approach to the assessment of effects. The identification and evaluation of effects have been based on the information set out in chapter 2: Project Description of this Environmental Statement, EIA good practice guidance documents and relevant topic-specific guidance where available.

Description of the environmental baseline conditions (including future baseline conditions)

4.4.2.5 The existing and likely future environmental conditions in the absence of the mWave project are known as 'baseline conditions'. Each topic-based chapter includes a description of the current (baseline) environmental conditions, and the future baseline without the mWave project. The baseline conditions at the site and within the surrounding study area form the basis of the assessment, enabling the likely environmental effects of the proposed works to be identified through a comparison with the baseline conditions.

4.4.2.6 The baseline data used for the assessment of environmental effects is primarily drawn from the last five years, namely between 2013 – 2018. However, where relevant and appropriate, more recent or additional older data has also been used to inform the baseline.

4.4.2.7 The baseline for the assessment of environmental effects characterises existing conditions within the proposed project study areas (defined by each technical chapter). Consideration has also been given to any likely changes between the time of reporting and the likely future baseline.

4.4.2.8 The consideration of future baseline conditions also includes the likely effects of climate change, as far as these are known at the time of writing. This will be based on information available from the United Kingdom (UK) Climate Projections project, which provides information on plausible changes in climate for the UK and on published documents such as the UK Climate Change Risk Assessment 2017 (Government, H.M., 2017). The likely future baseline has been described in each technical assessment (chapters 5 – 17).

Valued Ecological Receptors (VER)

4.4.2.9 Assessment of species or habitat receptors as Valued Ecological Receptors (VER) will be presented for appropriate ecological receptor groups in the baseline characterisation of each technical chapter (chapter 7: Benthic Subtidal and Intertidal Ecology; chapter 8: Fish and Shellfish; chapter 9: Marine Mammals; chapter 10: Marine Ornithology and chapter 17 Terrestrial Ecology), following the criteria set out in Table 4.2. Where amendments to these assessment criteria are required to reflect topic-specific interests, these are outlined in each of the technical chapters.

Table 4.2: Valued Ecological Receptors (VER) criteria.

Value of VER	Criteria to Define Value
International	- Internationally protected species and habitats that are the primary reason for site selection of internationally protected sites (e.g. Annex II protected species designated as features of an SPA); - Internationally protected species or habitat, which are not the primary reason for site selection, but are a qualifying interest features of the site; - Internationally protected species with known breeding or nursery areas within the Study Area that are considered to be important either nationally or internationally for that species, even where this has not been recognised through designation; or - Internationally protected habitats with overlap within the study area that are considered to be important either nationally or internationally for that habitat, even where this has not been recognised through designation.
National	- Internationally protected species or habitat that are not a qualifying interest features of a Special Protection Area (SPA) or Special Area of Conservation (SAC) but are regularly recorded within the study area. This might be in relatively low densities and therefore the area is not considered to be important for the species or habitat in an international context; and - Internationally protected species or habitats that are not qualifying interest features of an SPA or SAC but are recognised as a Biodiversity Action Plan (BAP) or Section 7 priority species or habitat either alone or under a grouped action plan and are listed on the local action plan relating to the Study Area.
Regional	Internationally protected species or habitat that are not qualifying interest features of an SPA or SAC and are infrequently recorded within the study area.
Local	Habitats or species that are considered of importance in a local context.

Limitations of the assessment

4.4.2.10 Each of the topic chapter describes any limitations identified in the available baseline data and whether there were any difficulties encountered in compiling the information required.

Mitigation measures adopted as part of the project

4.4.2.11 During the EIA process, environmental issues have been considered as part of an ongoing iterative design process. The process of EIA has therefore been used as a means of informing the design.

4.4.2.12 The mWave project assessed within this Environmental Statement therefore includes a range of measures that have been designed into the project to reduce or prevent significant adverse effects arising, for instance the positioning of mWave on sand away from Annex I reef habitat. These measures are outlined in Chapter 2, Section 2.6.2 and the assessment of effects has taken into account these measures.

4.4.2.13 The topic chapters also set out the measures to be adopted during installation or decommissioning to avoid and minimise environmental effects, such as pollution control measures. These measures would be implemented through the Environmental Management Plan (EMP), a draft of which will be submitted with the Environmental Statement. Bombora will seek to agree and finalise this plan with the regulatory authorities and key consultees during the post-application process; and

4.4.2.14 The measures that have been adopted are described in chapter 2: Project Description, and are summarised here:

- Environmental Management Plan (EMP), which will include a Marine Pollution Contingency Plan and an INNS assessment using NRW-PS Biosecurity Risk Assessment Template which will reduce the risk of spreading marine invasive non-native species (section 2.6.3); and
- Environmental Mitigation and Monitoring Plan (EMMP) (Section 2.6.4);

Assessment of effects

4.4.2.15 The EIA Regulations (as defined in Chapter 1: Introduction) require the identification of the likely significant environmental effects of the mWave project. This includes consideration of the likely effects during the installation, operational and maintenance, and decommissioning phases. The assessment is based on consideration of the likely magnitude of the predicted impact and the sensitivity of the affected receptor. The process by which effects have been identified and their significance evaluated is set out within each individual topic chapter. The overarching principles are set out below.

Magnitude of impact

4.4.2.16 Impacts are defined as the physical changes to the environment attributable to the project. For each topic, the likely environmental impacts have been identified. For each topic the likely environmental change arising from the mWave project (onshore and offshore) has been identified and compared with the baseline (the existing baseline without the project). Impacts are divided into those occurring during the installation, operational and maintenance, and decommissioning phases of the project.

4.4.2.17 The categorisation of the magnitude of impact is topic-specific but generally considers factors such as:

- Extent;
- Duration (whether the impact is short, medium or long term);
- Whether the impact is continuous or intermittent;
- Timing and frequency; and
- Reversibility.

4.4.2.18 With respect to the duration of impacts, the following has been used as a guide within this assessment, unless defined separately within the topic assessments:

- Short term: a period of days, up to six months;
- Medium term: a period of more than six months, up to five years; and
- Long term: a period of greater than five years.

4.4.2.19 Impacts will be defined as either adverse or beneficial. Depending on discipline, they may also be described as:

- Direct: Impact occurs through the direct interaction of an activity associated with the mWave project with an environmental receptor. These tend to be either spatially or temporally concurrent; or
- Indirect: Impacts on the environment which are not a direct result of the mWave project, often produced away from the site or as a result of a complex pathway.

4.4.2.20 Impacts will be divided into those occurring during the installation and decommissioning of the mWave project and associated infrastructure (cable and onshore control station), and those occurring during operation and maintenance of the project.

4.4.2.21 The magnitude of an impact has generally been defined used the following scale, as defined in Table 4.3:

- Major;
- Moderate;
- Minor;
- Negligible; and
- No change.

Table 4.3: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (adverse) Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality (beneficial)
Moderate	Loss of resource, but not adversely affecting integrity of resource; partial loss of/damage to key characteristics, features or elements (adverse) Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (beneficial)
Minor	Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements (adverse) Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (adverse) Very minor benefit to, or positive addition of one or more characteristics, features or elements (beneficial)
No change	No loss or alteration or characteristics, features or elements; no observable impact in either direction

Sensitivity or importance of receptors

4.4.2.22 Receptors are defined as the physical or biological resource or user group that would be affected by a project. For each topic, baseline studies have informed the identification of potential environmental receptors. Some receptors will be more sensitive to certain environmental effects than others. The sensitivity or value of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level. Reference will be made to Table 4.2 (Valued Ecological Receptors) when determining sensitivity or importance of ecological receptors.

4.4.2.23 Sensitivity is defined within each Environmental Statement topic chapter and takes into account factors including:

- Vulnerability of the receptor;
- Recoverability of the receptor; and
- Value/importance of the receptor.

4.4.2.24 Sensitivity is generally described using the following scale:

- Very High
- High;
- Medium;
- Low; and
- Negligible.

4.4.2.25 Table 4.4 provides a definition of each level of sensitivity. Where amendments to the value definition has been made in a technical chapter, these will be defined in the 'sensitivity' table associated with that topic chapter.

Table 4.4: Definition of terms relating to the sensitivity of the receptor.

Value (sensitivity of the receptor)	Description
Very High	Very high importance and rarity, international scale and very limited potential for substitution
High	High importance and rarity, national scale and limited potential for substitution
Medium	High or medium importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale

Significance of effects

4.4.2.26 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). This is identified by considering the magnitude of the impact and the sensitivity of the receptor.

4.4.2.27 The magnitude of an impact does not directly translate into significance of effect. For example, a significant effect may arise as a result of a relatively modest impact on a resource of national value, or a large impact on a resource of local value. In broad terms therefore, the significance of the effect can depend on both the impact magnitude and the sensitivity of the receptor.

4.4.2.28 Unless separately defined in the topic chapters, the assessment of significance takes into account relevant topic specific guidance, based on the following scale and guidance:

- **Substantial:** adverse or beneficial. They represent key factors in the decision-making process with regard to consenting/licensing. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer the most damaging impact and loss of resource integrity;
- **Major:** These beneficial or adverse effects are considered to be very important considerations and are likely to be material considerations in the decision-making process;
- **Moderate:** These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative impacts of such factors may influence decision making if they lead to an increase in the overall adverse effect on a particular resource or receptor;
- **Minor:** These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project; and

- **Negligible:** No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

4.4.2.29 Effects may also be categorised as direct or indirect, secondary, short, medium or long term, or permanent or temporary as appropriate.

4.4.2.30 Unless set out otherwise within the chapter, topic chapters use the general approach set out in Table 4.5 for assessment of significance. For some topics, a simplified or quantitative approach is considered appropriate.

Table 4.5: Assessment matrix.

Magnitude of impact						
Sensitivity of receptor		No change	Negligible	Minor	Moderate	Major
	Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
	High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
	Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

4.4.2.31 Unless set out otherwise in each topic chapter, effects assessed as moderate or above, are considered to be significant in terms of the EIA Regulations within this assessment.

Further mitigation and future monitoring

4.4.2.32 Where required, further mitigation measures have been identified within topic chapters. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment.

4.4.2.33 Where relevant and necessary, future monitoring measures have been set out within the topic chapters.

Cumulative Impact Assessment (CIA)

4.4.2.34 The EIA Regulations require consideration of cumulative impacts, which are effects on a receptor that may arise when the project is considered together with other proposed developments in the area. For the purposes of this Environmental Statement, the cumulative impact assessment in each chapter will assess the mWave project alongside the effect of other developments, on single receptors.

4.4.2.35 The cumulative impacts of the project in conjunction with other proposed schemes have been considered within each topic chapter of the Environmental Statement. Other developments considered within the CIA include those that are:

- Under construction;
- Permitted, but not yet implemented; and
- Submitted, but not yet determined.

4.4.2.36 The types of project that have been considered with the CIA include:

- Other marine renewables projects;
- Other marine and coastal developments; and
- Temporal as well as spatial effects.

4.4.2.37 It is noted that developments that are built and operational at the time of submission are considered to be part of the existing baseline conditions.

4.4.2.38 Details of the developments included as part of the CIA are provided in Table 4.6 below. These are illustrated in Figure 4.1. The initial screening reviewed each project based on proximity to mWave and the potential for a receptor pathways or for a potential significant cumulative impact effect to occur.

4.4.2.39 In undertaking the initial screening for the CIA for the mWave project, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside the mWave project. For example, relevant projects and plans that are already under construction are likely to contribute to cumulative impact (providing effect or spatial pathways exist), whereas projects and plans not yet approved or not yet submitted are unlikely to contribute to such an impact, due to the short duration of the mWave project (up to 18 months).

4.4.2.40 Table 4.6 provides details of all the identified projects, and then provides justification for further consideration within the various environmental topic chapters. Those which are not considered further are shaded and they are not considered further in the environmental topic chapters.

Table 4.6: Preliminary Screening of Projects Considered in the mWave Environmental Statement Cumulative Impacts Assessment (CIA)

Project phase	Developer - Reference	Approx. distance to mWave (km)	Spatial/ temporal overlap with the mWave project	Details	Date of Construction	Further Consideration required?	Justification
Dredging sites							
Installation/ Operation and Maintenance	Neyland Yacht Haven Ltd. - DML1743	11.5	No spatial overlap. Potential for temporal overlap.	Dredge and disposal from Neyland Marina - annual volume 5500 m ³ .	13/12/2017-12/12/2020	No	Dredging impact forms part of baseline and mWave project has no dredging or disposal associated with it. Distant from mWave and therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance	Milford Haven Port Authority - DML1646	4.5	No spatial overlap. Potential for temporal overlap.	Maintenance dredging throughout the Milford Haven. Annual volume 362500 m ³ .	09/03/2017-08/03/2022	No	Dredging impact forms part of baseline and mWave project has no dredging or disposal associated with it. Distant from mWave project and therefore highly unlikely to have any impact overlap. No further consideration.
Dredge disposal sites							
Installation/ Operation and Maintenance	Neyland dredge disposal site - LU190	11.5	No spatial overlap. Potential for temporal overlap	Location: South of Neyland within the central channel of the Milford Haven, 0.22 nm diameter x 5 m depth Status: Open	Not applicable	No	Disposal impact forms part of baseline and mWave project has no dredging or disposal associated with it. Distant from mWave project and therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance	Milford Haven dredge disposal site - LU170	5	No spatial overlap. No temporal overlap as site is closed.	Location: South of St Ann's Head at the mouth of the Milford Haven estuary, unknown diameter x 30 m depth. Status: Closed	Not applicable	No	Dredge disposal site is not in use therefore no further consideration required.
Installation/ Operation and Maintenance	St Ann's Head dredge disposal site - LU180	5	No spatial overlap. No temporal overlap as site is closed	Location: Within the Milford Haven dredge disposal site, unknown diameter x 30 m depth. Status: Closed	Not applicable	No	Dredge disposal site is not in use therefore no further consideration required.
Installation/ Operation and Maintenance	Milford Haven Two dredge disposal site - LU169	16	No spatial overlap No temporal overlap.	Location: To the south of Milford Haven dredge disposal grounds, unknown diameter x 50 m depth. Status: Open		No	Dredge disposal site is located approximately 16 km from the mWave project. Disposal impact forms part of baseline and mWave project has no dredging or disposal associated with it. It is therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance	Milford Haven Three dredge disposal site - LU169	37	No spatial overlap No temporal overlap.	Location: To the west of Milford Haven dredge disposal grounds, 1 nm diameter x unknown depth. Status: Open		No	Dredge disposal site is located at its closest 37 km from the mWave project. Disposal impact forms part of baseline and mWave project has no dredging or disposal associated with it. Project is highly unlikely to have any impact overlap. No further consideration.
Research							
Installation	Greenlink Interconnector Ltd. - RML1827	0	Potential spatial overlap Temporal overlap	Ground investigations		Yes	Research operations are likely to have vessels present, with equipment for undertaking ground truthing surveys therefore this project cannot be excluded from further consideration in the CIA.
Installation	University College of Swansea - DEML1861	7	Location is assumed to be by the Pembroke Power station. No spatial overlap. Temporal overlap.	Pembroke Power bubble barrier experiment Investigation into the effectiveness of bubble curtains in sediment management	07-2018 - no end date given Band 2 licence issued 12/12/2018 - three-year study	No	Distant from mWave project and therefore highly unlikely to have any impact overlap. No further consideration.
Installation	University College of Swansea - DEML1845	1.5	Potential spatial overlap Temporal overlap	Deposition and subsequent removal of marker buoys with environmental monitoring and mid-water settlement plates.	30/08/2018-29/08/2019	No	Vessels and equipment will be required for the placement of marker buoys. Whilst the ML is currently valid, it is unlikely to have temporal with mWave activities, as ML finishes in August 2019. No further consideration.
Installation/ Operation and Maintenance	Neyland Yacht Haven Ltd - CML1658	11.5	No spatial overlap. No temporal overlap.	Pile replacement in Neyland Marina.	21/11/2016-20/11/2019	No	Pile replacement is currently ongoing until 2019, which does not overlap with the installation and operational phases of mWave. Given the distance from mWave

Project phase	Developer - Reference	Approx. distance to mWave (km)	Spatial/ temporal overlap with the mWave project	Details	Date of Construction	Further Consideration required?	Justification
							project it is therefore highly unlikely to have any impact overlap. No further consideration
Installation/ Operation and Maintenance	Mixed use developments - Local Planning Authority Reference: 14/0158/PA	10	No spatial overlap. Temporal overlap remains unknown.	Undetermined planning application. Demolition of several existing buildings and the mixed-use redevelopment of Milford Waterfront comprising up to 26,266 m ² of commercial, hotel, leisure, retail and fishery related floorspace. Up to 190 residential properties, up to 70 additional marina berths, replacement boat yards, landscaping, public realm enhancements, access and ancillary works. A decision on this application is yet to be made by the local planning authority.	EIA screening decision was returned on the 30/04/2018 - no further information has been provided	No	Given the distance from mWave project it is therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance/ Decommissioning	Greenlink Interconnector Ltd. - Government reference: qA1296053	0	Spatial overlap at edge of deployment area. Temporal overlap	The Project is a 500MW subsea electricity interconnector linking the power markets in Ireland and Great Britain and is planned for commissioning in 2023. As an EU Project of Common Interest, it is one of Europe's most important energy infrastructure projects. The interconnector is planned to make Landfall at Fresh Water West beach	07/2018 - ongoing	Yes	Given potential for temporal and spatial overlap with mWave this project cannot be excluded from further consideration in the CIA.
Installation/ Operation and Maintenance/ Decommissioning	Valereo - Welsh Government reference: qA1312073		No overlap with the mWave project. Onshore is remote from mWave control station site.	Development of a cogeneration facility to supplement electrical power and steam demands of the refinery all within the refinery boundaries on land.	07/12/2017 - Nationally significant project (ongoing)	No	Project is assumed to have no marine elements to the project. Onshore is remote from mWave control station site (inner face of Haven), therefore there will be no impact overlap. No further consideration.
Installation/ Operation and Maintenance	EGNEDOL Wales Ltd	N/A	Potential temporal overlap	EGNEDOL propose to create an environmentally sustainable centre of excellence in Milford Haven, at the Waterston and Blackbridge sites. The proposal includes providing business units and refurbishing a jetty to serve as a primary supply link to the EGNEDOL electricity generation plan, and for export of products. The land-based green energy scheme may generate up to 350 MW.	Not available	No	Planning permission for the EGNEDOL project was refused on 19/10/2018, therefore it is considered highly unlikely that this project will overlap temporally with the mWave project. No further consideration.
Ministry of Defence sites							
	Ministry of Defence	0.1	Temporal overlap	The Castlemartin Range is located immediately south of the entrance to the Waterway and extends for up to 12 NM from the coast between Little Furznip (at the southern extent of Freshwater West) and St Govan's Head (Milford Haven Port Authority 2019). The southern boundary of the East Pickard Bay (Site 8) site is located adjacent to the northern boundary of the Castlemartin Military Practice Area D113A. The range at Castlemartin supports the training of military personnel (Army) in the firing of a range of munitions at land based targets. The seaward danger area provides a safety zone for overfire and shrapnel which may result from the striking of targets (RPS, 2010). The Castlemartin Range is used every day of the week and on some weekends (RPS, 2010).	Not applicable	Yes	There is a high level of uncertainty as to timing of MOD activities at the MOD site, however on-going activity is likely therefore there is the potential for cumulative impacts with the mWave project.
Aquaculture projects							
Installation/ Operation and Maintenance	Tethys Oysters	3	Temporal overlap	The oyster farm is located on the eastern side of Angle Bay, whereby oysters are grown in baskets on metal supports. The farm will be serviced from the shore by foot	Oct 2017 – Oct 2020 (possible renewal of licence)	No	Whilst there is potential for temporal overlap with the mWave project, it is distant and therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance	Pembrokeshire Scallops	6.5	Temporal overlap	The scallop farm is located within Castlebeach Bay, whereby a system of weighted ropes will be deployed	Jan 2019 – Q4 2020 (possible renewal of licence)	No	Whilst there is potential for temporal overlap with the mWave project, it is distant and therefore highly unlikely

Project phase	Developer - Reference	Approx. distance to mWave (km)	Spatial/ temporal overlap with the mWave project	Details	Date of Construction	Further Consideration required?	Justification
				for growing scallops and mix species of native algae. The farm will be serviced by vessels and divers	licence)		to have any impact overlap. No further consideration.
Pembroke Dock Marine Projects							
Installation/ Operation and Maintenance	Milford Haven Port Authority - SC1810: Pembroke Dock Infrastructure	10	No spatial overlap. Potential for temporal overlap	Pembroke Dock redevelopment. Scoping Report submitted. The intention of the Project is to create a flexible and efficient port-related office, industrial, warehousing and distribution, and ancillary operations infrastructure. This will involve the redevelopment of its existing space to incorporate increased deep-water access, internal and external heavy fabrication areas, construction of MEECE and Education/Skills Facility and the construction of a heavy lift facility.	Q3 2019 – Q3 2023	No	Port activity as a result of Pembroke Dock Port operations is distant and therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance	META Project, Site 8	0	Spatial overlap Temporal overlap will occur throughout the duration of the mWave project	The META project will allow the deployment and testing of marine renewable devices in the waters off East Pickard Bay. META Site 8 will be consented for up to two devices. An assessment of the maximum META project design has been undertaken in the ES supporting the consents.	In consenting	Yes	Given potential for temporal and spatial overlap with mWave this project cannot be excluded from further consideration in the CIA
Installation/ Operation and Maintenance/Decommissioning	Marine Energy Wales - DEML1875	9.4	No spatial overlap Potential for temporal overlap	Marine Energy Test Area - Phase 1 Band 2 application submitted. The Project aims to create pre-consented test areas within the Pembroke Dock area. The test areas will have licensable activities to suit testing of initial stage marine renewable devices. These include testing of non-operating components and subassemblies. No full-scale testing is to be support within the test areas	21/04/2019-21/04/2029	No	Project is distant and therefore highly unlikely to have any impact overlap. No further consideration.
Installation/ Operation and Maintenance/Decommissioning	Wave Hub Ltd. - SC1082	20	No spatial overlap No temporal overlap	Demonstration zone Scoping Report submitted The Project entails the development of 90 km2 of seabed with water depths of approximately 50 metres and a wave resource of approximately 19 kW/m; to support the demonstration of wave arrays with a generating capacity of up to 30MW for each project. Consent for this Project could be achieved in 2022, infrastructure could be built by 2024 and the first technology could be installed in 2025.	2024	No	No temporal overlap with the mWave project. No further consideration.

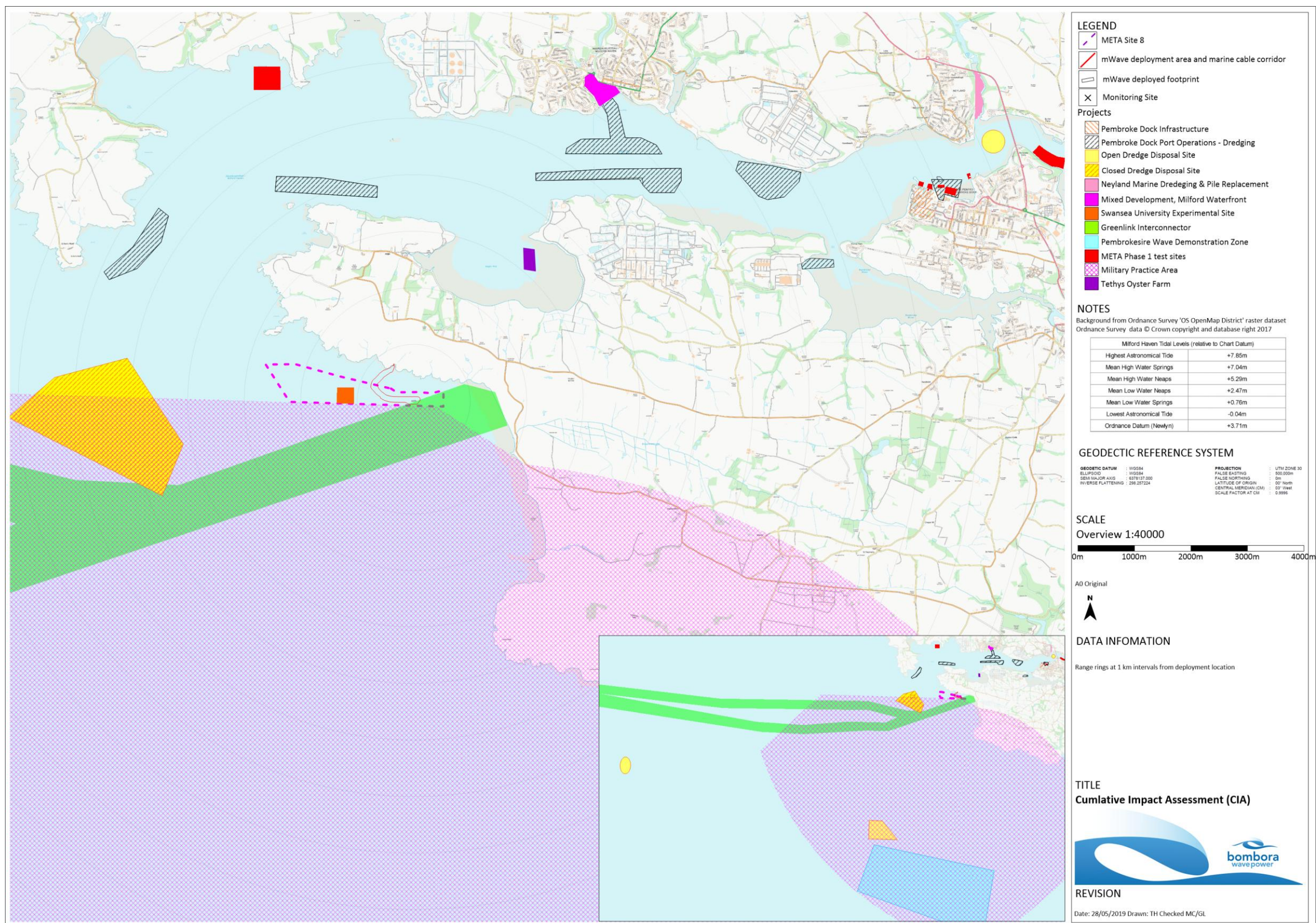


Figure 4.1: Projects/plans considered in the Cumulative Impact Assessment (CIA) for each technical chapter.

Transboundary impacts

- 4.4.2.41 Each technical chapter considers whether there is the potential for any transboundary impacts on other European Union (EU) states.

Inter-relationships

- 4.4.2.42 Each topic chapter considers whether or not there are any inter-related effects with other topics included within the EIA that have not already been considered in order to identify any secondary, cumulative or synergistic effects.
- 4.4.2.43 Inter-relationships are considered to be the impacts and associated effects of different aspects of the mWave project on the same receptor. These are considered to be:
- Project lifetime effects: assessment of the scope for effects that occur throughout more than one phase of the project (construction/installation, operational and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages (e.g. subsea noise effects, operational turbines, vessels and decommissioning); and
 - Receptor-led effects: assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on marine mammals, such as direct habitat loss or disturbance, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

Summary tables

- 4.4.2.44 Summary tables have been used to summarise the effects of the mWave project for each environmental topic within each of the technical chapters.

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