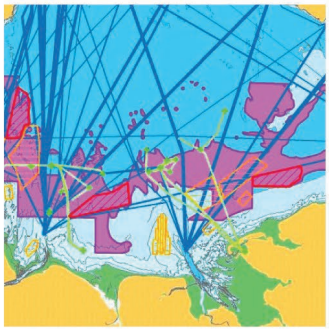
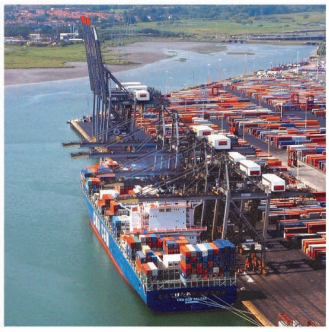
Welsh Government

Sustainable Management of Marine Natural Resources – Part 2

Detailed work plan

July 2019



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Notice

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Summary

Marine planning is being developed in Wales to ensure current and future generations can continue to enjoy the wealth of benefits provided by the sea, through the sustainable management of natural resources.

Through the emerging Welsh National Marine Plan (WNMP), a statutory, strategic policy framework is being put in place to help guide marine decision making, helping to ensure the right development can happen in the right place and the right way. The WNMP contains policies to help guide marine management, some of which are related to cross-cutting general issues such as access to our seas or nature conservation. Others are specifically related to the different sectors that operate in our seas, including shipping, renewable energy, aggregates, fisheries and aquaculture.

Welsh Government has been awarded a European Maritime and Fisheries Fund (EMFF) grant to develop, and make available, a targeted environmental evidence base on the marine environment to support implementation of marine planning in Wales. To help meet this requirement, the 'Sustainable Management of Marine Natural Resources' (SMMNR) project, funded by the European Maritime and Fisheries Fund and Welsh Government, is developing the environmental evidence base in relation to tidal stream energy, wave energy and aquaculture resources in the Welsh marine area. In particular, the project is examining how use of these resources may affect marine protected areas (MPAs) and other sensitive species and habitats.

The three activities that have been selected as a priority for this project (referred to as focus activities) encompassing tidal stream energy, wave energy and aquaculture, are identified on the basis of:

- Being of strategic importance; but
- Lacking an existing easily accessible, applied, fit for purpose and coherently structured in-depth evidence base; and
- The collation and interpretation of in-depth datasets and new evidence being achievable within the scope and budget of the EMFF project.

The main objectives of this project were therefore to address the need for fit for purpose (synthesised, interpreted, quality assured and refined) data and knowledge to support marine environmental protection and sustainable use of aquaculture, tidal (stream) energy and wave energy resources.

The first part of the SMMNR project was completed in January 2019. Over 420 datasets were collated, and quality assessed covering physical, chemical, biological and human environment data relevant to tidal stream energy, wave energy and aquaculture activities. Data were quality assessed against attributes including appropriateness, methodology and accuracy. Following collation and review of relevant data, recommendations were made on how evidence and data gaps could be addressed, including through targeted studies. A key recommendation was to collect further benthic data and so enhance the development of consistent quality benthic habitat maps across identified resource areas.

This report provides the detailed work plan for the second part of the SMMNR project, which will identify environmental constraints and opportunities for development of these three focus activities. These objectives will be achieved through the utilisation of existing datasets, the collection of key data and engagement with stakeholders throughout the process.

The end point of the project will be the production of evidence packages applicable to resource areas associated with each of the activities. These packages will provide information on constraints and opportunities, locational guidance, spatial data and links to relevant research. Consultation with stakeholders will help to inform the format and guidance within these packages to ensure that their benefit is maximised.

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1 Introduction

There is increasing recognition of the need to better manage marine activity both to ensure that environmental objectives are met but also to enable sustainable blue growth (economic growth based on several maritime sectors). Marine spatial planning is important for addressing increased competition for space between activities and for seeking to ensure that the capacity of the marine environment is not exceeded.

Within the United Kingdom (UK), the Marine and Coastal Access Act (MCAA) 2009 established a statutory system of marine planning for UK waters, including waters around Wales. At a wider European Union (EU) level, the Maritime Spatial Planning (MSP) Directive (2014/89/EU) established a statutory framework for maritime spatial planning across all of EU waters with the objective of developing marine plans covering the entirety of EU waters by 2021. MSP is a key component of the EU's Integrated Maritime Policy (IMP) which seeks to provide a more coherent approach to maritime issues.

Under the MCAA, the UK Marine Policy Statement (MPS; HM Government, 2011) provides the high-level context for marine planning and the framework for preparing national and regional marine plans, including the Welsh National Marine Plan (WNMP). The MPS sets out five High Level Marine Objectives (HLMOs) which have guided the development of the WNMP:

- Achieving a sustainable marine economy;
- Ensuring a strong healthy and just society;
- Living within environmental limits;
- Promoting good governance; and
- Using sound science responsibly.

Following a period of formal consultation (7 December 2017 to 29 March 2018), the draft WNMP text has been refined. Formal adoption of the plan by The Welsh Ministers and the Secretary of State at Defra is now expected in summer 2019. Once adopted, Welsh Government will work with plan users to support plan implementation. One aspect of this work will involve taking a 'spatial approach' to understanding opportunities for future sustainable resource use. This spatial approach will support WNMP implementation and provide understanding of socio-economic, cultural and environmental opportunities and constraints. By developing an understanding of the key spatial opportunities and constraints, those wishing to use Welsh seas will understand how they can do so sustainably.

Guided by the UK Marine Policy Statement (MPS), the WNMP has a distinct Welsh context and applies the principles of the Well-being of Future Generations (Wales) Act 2015 and Environment (Wales) Act 2016. The WNMP is a planning tool to implement shared UK policy expressed in the UK MPS. It is also a tool to support Natural Resource Management through the Natural Resources Policy which sets out that '*the WNMP will guide the way in which we will take forward the delivery of the NRP priorities in this area as a part of our approach to the management of Wales' marine natural resources'*. In this way, policies in the WNMP support the delivery of the priorities within the current NRP. These are:

- Delivering nature-based solutions;
- Increasing renewable energy and resource efficiency; and
- Taking a place-based approach.

Sustainable management of marine and coastal natural resources is central to the WNMP objectives and the Sustainable Management of Marine Natural Resources (SMMNR) project (this project) is intended to increase the sustainable utilisation of the marine environment. The policy rationale set out in the WNMP is to:

- Ensure the sustainable management of natural resources by taking account of cumulative effects of human pressures;
- Encourage economically productive activities in areas of good opportunity;
- Support the sustainable development of marine renewable energy resources;
- Provide space to support existing and future sustainable co-location of different activities and reducing avoidable displacement activities;
- Support the achievement and maintenance of Good Environmental Status (GES);
- Protect and enhance marine biodiversity including Marine Protected Areas (MPAs); and
- Enhance the resilience of marine ecosystems.

Area Statements will facilitate the implementation of the national priorities in the NRP in a local context, recognising the different needs across different parts of Wales. The NRP requires Public Authorities taking authorisation or enforcement decisions relevant to the marine area to have regard for the evidence in any relevant Area Statement. There are a number of ways that Area Statements could add value to and support the implementation of the WNMP:

- Developing evidence to support decision-making in relation to spatial marine plan policy;
- Developing evidence to support decision-making in relation to other marine plan policy; and
- Supporting a joined-up approach over the land-sea interface.

Where there is a clear need and adequate information, Strategic Resource Areas (SRAs) will be identified to support application of WNMP sector safeguarding policies i.e. policies to '*promote compatibility and prevent unnecessary adverse impacts on other users and uses of the marine environment* '. The WNMP sets out that the first step to developing an SRA is to identify need and technical viability of the SRA. The WNMP goes on to state: 'as marine planning matures, and as understanding, familiarity with the planning system and knowledge of the evidence base develop, SRAs will be further refined and may evolve to offer greater clarity and certainty to developers and decision makers. Where there is good confidence, marine planning, over time, may not only safeguard natural resources but also identify areas for sustainable use.'

Although formal identification of SRAs will be through the publication of Marine Planning Notices, early consideration of suitable resource for sustainable exploitation allowed identified resource areas (originally defined as draft SRAs) for certain sectors to be explored within the draft WNMP and the early stages of the SMMNR project.

Identified resource areas, as they have currently been defined, take account of sectoral constraints on development but do not fully address potential environmental issues associated with different types of developments and activities in these areas. Consequently, there is a need to better understand environmental constraints and opportunities, particularly where they overlap with areas of higher environmental sensitivity such as Marine Protected Areas (MPAs). There is also a need to assess the most sustainable opportunities for development and use of marine natural resources within these draft resource areas, at a local level, particularly given that there is a significant overlap with MPAs. The key purpose of this study is to initiate and progress work to identify and meet these evidence requirements.

1.1 European Maritime and Fisheries Fund

Welsh Government has been awarded a European Maritime and Fisheries Fund (EMFF) grant to develop, and make available, a targeted environmental evidence base on the marine environment to support implementation of marine planning in Wales. The three activities that have been selected as a priority for this project (focus activities) encompass:

- Tidal stream energy;
- Wave energy; and
- Aquaculture.

These focus activities were identified on the basis of:

- Being of strategic importance, but lacking an existing easily accessible, applied, fit for purpose and coherently structured in-depth evidence base; and
- The collation and interpretation of in-depth datasets and new evidence being achievable within the scope and budget of the EMFF project.

The main objectives of the SMMNR project are therefore to address the need for fit for purpose (synthesised, interpreted, quality assured and refined) data and knowledge to support marine environmental protection and sustainable use of tidal energy, wave energy and aquaculture resources. Stakeholder collaboration is central to delivery thereby strengthening outputs and stakeholder buy-in to the project. This includes generating as much consensus as possible between all stakeholders (including developers and regulators) about the outputs so that there is a shared understanding of the constraints and opportunities relating to these areas.

1.2 Overall approach

The SMMNR project is intended to increase understanding of the marine environment and to develop plans that provide sufficient local specificity and data against which benefits of marine planning can be understood and demonstrated. The project will do this through the consideration of relevant and available datasets, analysis and interpretation of biological, chemical and physical data, in addition to gathering new evidence that specifically relates to the focus activities and areas of suitable resource for sustainable exploitation.

Thus, the project will address key knowledge gaps in marine planning such as the carrying capacity (i.e. environmental limits) of identified resource areas for the intended activity and specific areas of particular sensitivity or opportunity at the local scale.

The end point of the project will be the production of evidence packages applicable to resource areas associated with each of the activities. These packages will provide information on constraints and opportunities, locational guidance, spatial data and links to relevant research. Consultation with stakeholders will help to inform the format and guidance within these packages to ensure that their benefit is maximised.

The first part of the SMMNR project has been completed (ABPmer, 2019). Over 420 datasets covering physical, chemical, biological and human environment data relevant to tidal stream energy, wave energy and aquaculture activities. Data were quality assessed against attributes including appropriateness, methodology and accuracy. Data assessed as high quality with high confidence were considered important for informing marine spatial planning of tidal stream energy, wave energy and aquaculture in Welsh waters (Figure 1). Following collation and review of relevant data, recommendations were made on how evidence and data gaps could be addressed, including through targeted studies (ABPmer, 2019). For example, a key recommendation was to collect further benthic data; facilitating the development of consistent quality benthic habitat maps across identified resource areas.

Within the ABPmer (2019) report, additional background information was provided on each of the three focus activities, along with consideration of the consenting process for the focus activities and key issues associated with their development implementation.

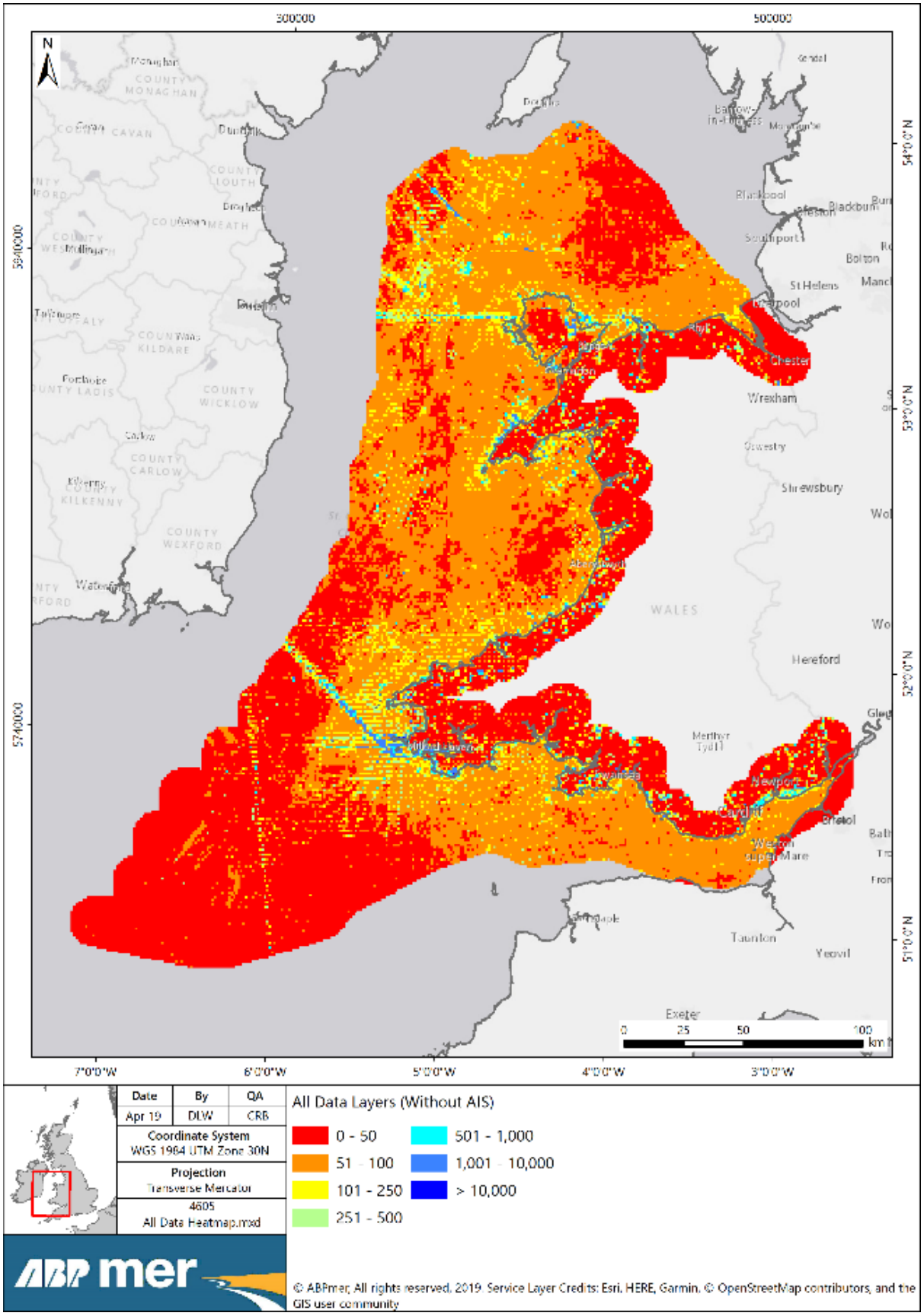

Figure 1. Number of relevant data layers within Welsh waters (relative data density per km^2)

To inform the next part of the SMMNR project, which will identify environmental constraints and opportunities for development of the three focus activities, a detailed work plan has been provided within this document. The work is subdivided into the following key tasks:

- Development of detailed work plan (this document);
- Data collection and processing;
- Constraints and opportunities analysis; and
- Production of evidence packages.

Further detail on each of these tasks is outlined within subsequent sections of this document.

As part of the data collection exercise it was first necessary to carry out a high-level analysis of constraints and opportunities (see Appendix A). This allowed selection of suitable survey areas following discussion with NRW and Welsh Government.

2 Detailed Work Plan

2.1 Key tasks

This section of the report provides the detailed work plan for the second part of the SMMNR project. This section has been structured according to the core tasks with additional information on project, resource and risk management:

- Data collection and processing (Section 2.2);
- Constraints and opportunities analysis (Section 2.3); and
- Production of evidence packages (Section 2.4).

Outcomes from early stakeholder engagement have been acknowledged within the work plan. These outcomes along with those from future stakeholder engagement will be used to progress the project. Details of the stakeholder engagement plan are provided below (Section 2.5) with stakeholder engagement anticipated to run alongside all of the project tasks. Acknowledging all elements of the core tasks, a detailed work programme is then provided at the end of this section.

To inform the work plan and progress key data collection tasks at the earliest opportunity, high-level constraints analysis was required to rationalise the selection of suitable geographical locations for survey work. The detail on this process is provided in Appendix A and will be included within the final report.

2.1.1 Data collection

A number of evidence gaps were highlighted during the data collation exercise (ABPmer, 2019). Subsequently, a key recommendation was the requirement for an increased understanding of benthic feature extent within Welsh territorial waters (ABPmer, 2019). It was agreed, with NRW and Welsh Government (30 March 2019), that delivery of the most beneficial strategic evidence would be achieved through targeting survey effort on benthic features at one or two focussed areas. The following section details how this targeted survey work will be delivered.

2.1.2 Survey

Following further discussion and careful consideration of how best to prioritise data collection effort (see Appendix A), NRW and Welsh Government (23 May 2019) confirmed that survey work covers two broad geographical areas. The first off St David's Head, Pembrokeshire; and the second to the west of Anglesey. The rationale behind their selection is provided in Appendix A, which also provides the detail on the survey approach which partly informed the rationale.

Although the offshore and exposed nature of the agreed survey locations does not provide much opportunity for shelter from prevailing wind conditions, several measures have been adopted in the planning to reduce the risk and potential impact from down weather time (see Section 2.7: Risks).

During selection of suitable survey locations, early prioritisation was afforded to those areas which would maximise the value of evidence obtained (see Appendix A) rather than those areas which offered relatively good shelter from prevailing wind conditions. The latter approach would have restricted survey work to areas limited in resource options i.e. were close inshore and not deemed suitable for tidal stream or wave resource. By contrast, the options taken forward encompass areas that overlap with more than one type of identified resource area and are likely to overlap with reef features.

Annex I 'reef' features are recognised as a key environmental constraint i.e. their presence would likely increase consenting risk for marine developments. Identifying presence/absence of reef features is important for site selection and, during the inception meeting (20 March 2019), it was agreed with NRW and Welsh Government that a key objective for the data collection work was increasing the knowledge base and mapping of reef features in Welsh waters.

Approach

The survey work will encompass broad baseline characterisation of areas initially identified as suitable for one or more focus activities (identified resource areas). However, survey work will not be constrained to the boundaries of these identified resource areas.

The presence of certain benthic features, such as Annex I and Section 7 habitats, increases consenting risk for marine developments. Hence, determining the presence/absence of these features will be a key objective of the benthic survey work. This will include consideration of rocky, stony and biogenic reefs, the latter including horse mussel beds and *Sabellaria* sp. reefs. Similarly, Section 7 habitat features will be identified and recorded where practicable within the survey methodology. Such Section 7 habitat features will likely include subtidal sands and gravels and possibly fragile sponge and anthozoan communities on subtidal rocky habitats.

Reflecting the nature of the prioritised benthic search features, the survey methodology will be a combination of multibeam (backscatter) supplemented by Drop-Down Video (DDV). This will allow broadscale characterisation of the benthic habitats with regular groundtruthing from DDV, the latter also providing high resolution of benthic features.

To maximise development of the evidence base it is important that relevant existing data are clearly identified. Accordingly, the survey work will acknowledge those areas of the seabed that have been previously mapped, particularly with medium to high confidence in the data, or are likely to be the subject of ongoing or recently proposed benthic mapping studies, including those associated with baseline characterisation to inform marine developments. Further detail on the survey approach is provided in Appendix A.

Design and execution of the multibeam survey will acknowledge seabed mapping guidelines from MESH, where available, and guidance such as Ware *et al.* (2011) and Saunders *et al.* (2011). Data collected will conform to IHO standards (S44 and S57).

When collecting multibeam data, an appropriate overlap will be maintained to ensure that 100% coverage is achieved without any data gaps or holes. Appropriate statistical analysis of cross line/ main line intersections will be made to assess the quality of the data.

The DDV groundtruthing work will use guidance provided by Ware *et al.* (2011) and Saunders *et al.* (2011) to plan and carry out the activity, with acknowledgment to NRW guidance to benthic habitat survey and monitoring (Guidance Note: GN030; GN030-intro).

As previously mentioned, the outline survey approach (see Appendix A) has been agreed with Welsh Government and NRW (23 May 2019). Development of logistical planning will now progress for the proposed survey activities. Activity specific risk assessments and safe systems of work will be provided to Welsh Government and NRW to review in advance of any survey work being carried out.

It is currently envisaged that the multibeam survey will commence in late July 2019, with the DDV survey to commence several weeks after completion of the multibeam work. Processing of the multibeam data will allow positioning of groundtruthed sites at each of the broad geographical locations.

To mitigate risk of weather down time, the surveys are planned to coincide with months that are generally predicted to represent the least weather down time. Further detail on project risks and contingency planning is provided in Section 2.7.

Processing

All data will be collected and analysed in accordance with ISO 9001 quality assurance procedures with storage of metadata compliant with MEDIN data standards. A copy of all raw survey data will be produced and made available to NRW.

Processing of multibeam backscatter data will indicate potential changes in seabed character and thus inform selection of DDV stations for groundtruthing. Some processing of data will take place during the survey. This will allow modifications to be made to the survey plan and also inform the locations for subsequent groundtruthing by DDV.

Methods used to derive final depths such as cleaning filters, sounding suppression/data decimation, binning parameters etc. will be done so sensitively, bearing in mind the importance of the sediment surface features. Caris HIPS and SIPS 11.1 will be used to process the backscatter and bathymetric data. Further detail is provided in Appendix A.

Video footage will be analysed in-line with best working practices, for example acknowledging the Marine Environmental Data and Information Network (MEDIN) 2016 data guidelines for video survey as relevant. As mentioned above, presence/absence of Annex I reef feature will be noted and geo-referenced, along with any clearly discernible Section 7 features.

Data from each video transect will include the following:

- Survey and event reference number and name (e.g. survey name, location, tow number etc.);
- Survey date;
- Latitude and Longitude (WGS84) of start and end of transect (and at changes in substrate/broad feature where possible);
- Time on video at start and end of transect and at changes in substrate/broad feature type;
- Substrate and broad feature description (including type of reef where discernible);
- Key characterising species and observations of any protected, rare or invasive species;
- Water depth (where available);
- Video quality (rated as good/ moderate/ poor); and
- Confidence in reef presence and consideration of reef/Section 7 habitat quality

Interpretation of the multibeam data will be carried out by experienced personnel utilising the outputs of the DDV groundtruthing stations to create a broadscale habitat map of the survey area(s), with the final outputs of the work being illustrated and mapped using GIS. It is anticipated that the mapping outputs will indicate presence of rocky and stony features as well as sand and/or gravel habitats.

Following analysis and processing of collected data, relevant existing datasets will be updated and improved to encompass the findings from the targeted survey work.

2.2 Constraints and opportunities analysis

2.2.1 Introduction

A key aspect of this project involves taking a 'spatial approach' to understanding opportunities for future sustainable resource use. Understanding the spatial opportunities and constraints will inform decision-making on practical, sustainable development of the focus activities in Welsh waters.

As part of this project, information on environmental constraints and opportunities, along with locational guidance, spatial data and links to relevant research will be developed and provided within evidence packages related to identified resource areas, or groups of resource areas.

Although yet to be fully defined, in the context of this work 'environmental constraints' to the SMMNR project are considered as those spatial constraints which are likely to increase consenting risk to one or more of the focus activities.

2.2.2 Approach

The environmental constraints and analysis methodology will be developed in collaboration with Cefas who, as part of the SMMNR project, are carrying out environmental constraints analysis for aggregate resources, and in discussion with NRW and Welsh Government (see Section 2.5: Stakeholder Engagement).

Alongside this work, a related SMMNR project covering GIS methodology for analysis of spatial constraints and opportunities in Welsh waters is due to be commissioned in August 2019. ABPmer will develop and maintain links with the successful contractor, as well as with Cefas, to ensure that there is an integrated approach across all three projects (see Section 2.5: Stakeholder Engagement).

Understanding the slightly different timescales between the ABPmer work and other SMMNR work packages, the timing of the constraints methodology development has been aligned to maximise collaborative benefits (see Section 2.6 Programme).

Constraints and opportunities analysis of those identified resource areas which are not the focus of the data collection activity will commence before completion of the data collection exercise. The analysis will be cognisant of the outcomes from related projects, such as work to inform environmental constraints for aggregate related activities and, in particular, the development of an agreed methodology for weighting constraints in relation to the focus activities. When the data collection exercise has been completed, the final outputs from the survey work will feed into the environmental constraints analysis for the relevant resource areas, or groups of identified resource areas.

Adoption of a risk-based approach to the consideration of environmental constraints will seek to identify relative levels of risk within and around the identified resource areas, or groups of identified resource areas. The risk-based approach will consider potential impact pathways that could arise from the three focus activities (including those for which there is known to be greater uncertainty, as identified within the first part of the SMMNR project (ABPmer, 2019)), available information on the spatial distribution of key receptor features across and around the identified resource areas (from data collated and collected during the SMMNR project) and information on receptor sensitivity to likely pressures associated with construction and operational activities. This will include all stages of a potential project.

A standardised activities-pressures-sensitivity approach to such analysis will be used drawing on the best available evidence, including the wealth of evidence collated during the first part of the SMMNR project. This will include consideration of wider activities that are already known to occur within these areas and as such the potential for in-combination and cumulative effects. It is recognised that there is limited scientific understanding of environmental thresholds and carrying capacity in the marine environment. In such circumstances adaptive management may provide a mechanism for managing potential risk, as part of a risk-based approach to applying the precautionary principle. However, where it is possible to understand the environmental thresholds within an area then these will be incorporated into the constraints analysis.

The opportunities and constraints for the co-location of activities will also be considered within the analysis. It is recognised that there can be significant operational constraints in seeking to co-locate activities but there can also be synergies, such as shared access to infrastructure. Engagement with stakeholders will be important here in seeking to identify such synergies and encourage uptake.

Stakeholder inputs will be sought, from Welsh Government, NRW and developers/producers to assist in identifying previously identified and potential constraints to developing within the identified resource areas (see Section 2.5: Stakeholder Engagement). On this basis constraints maps for each identified resource area, or groups of identified resource areas, for each focus activity will be generated.

The constraints and opportunities maps will be produced and presented within the final report and also provided as a shapefile or geodatabase GIS datasets. Where datasets are updated as part of this work e.g. data collection task, they will be fed back in to the over-arching evidence database (developed in the first part of the SMMNR project). Discussions will also be held with NRW where it has implications for datasets that they currently maintain. Ongoing and defined consultation with NRW technical leads (see Table 1 and Section 2.5: Stakeholder Engagement) will allow the most up to date and relevant datasets to be selected.

Although outside of the project scope, high-level consideration will be given to some of the wider constraints for development of the focus activities, as previously identified within the ABPmer (2019) report e.g. grid connectivity, cumulative effects of other large-scale marine developments etc.

2.3 Production of evidence packages

The end point for this part of the SMMNR project will be the production of evidence packages for each identified resource area or groups of identified resource areas, providing information on guidance, constraints, evidence, spatial data etc. The format of the packages and the guidance will be consulted upon with stakeholders to ensure maximum benefit and uptake is achieved (see below) but is likely to include information on guidance, constraints, evidence, spatial data etc.

2.3.1 Guidance

The constraints analysis will be used to develop a narrative on locational guidance across and around the identified resource areas. It is noted that production of guidance has a prescribed process within Welsh Government and NRW, as such the outputs from this project will be in a format that can be easily transcribed into official guidance documents. Stakeholder engagement, including between Welsh Government and the various functions within NRW, will be facilitated and communicated by ABPmer, to discuss how guidance is best presented and the information it should provide.

Guidance developed by ABPmer will likely include:

- Relative environmental constraint narrative – this will describe key relative constraints identified on the basis of existing information, for example, location of sensitive habitats to be avoided;

- Advice on data gaps/likely data survey requirements for project level development within each identified resource area, or groups of identified resource areas; with signposting to existing guidance on survey methods – this would be based on the gap analysis completed in the first part of SMMNR project, further focused for project-level requirements.
- Broader generic guidance would also be included on marine licensing and consenting requirements (this will largely be the same across each identified resource area) or through signposting existing guidance (again building on the outputs from the first part of the SMMNR project). Similarly, the types of assessments required as part of the consenting regime would also be incorporated; and
- Signposting to more general guidance on post-consent monitoring requirements.

2.3.2 Evidence packages

As the end product to the SMMNR project, the development of these evidence packages will be maximised through early and consistent stakeholder engagement (see Section 2.5: Stakeholder Engagement). It is currently envisaged that the packages would be split by sector (tidal stream energy, wave energy and aquaculture) and further divided into broad geographical locations relevant to each sector.

Based on the opportunities identified for suitable resource of tidal stream and wave energy (identified resource areas), this would result in a focus on those broad geographical locations relevant to these sectors.

With the potential for aquaculture development along much of the Welsh coast it may be better to focus on discrete geographical regions e.g. north, central, south. The evidence package for a given region covering multiple areas of identified aquaculture resource.

As detailed above, these packages will provide information on constraints and opportunities, guidance (see above), spatial data and links to relevant research and key datasets. To enable early discussions with relevant stakeholders a draft template of an evidence package is provided in Appendix B.

To allow the packages to be dynamic tools with live links to other relevant information, it is envisaged that they would be web based. This would also allow regular updates in line with changes to guidance and legislation, while being cognisant of new and relevant data, research and changes in technology. Where changes in spatial constraints mapping arise, these should be reflected in the packages.

The packages would include links to a variety of sites and data, including the Wales Marine Planning Portal, Welsh Government websites and Lle Geoportal, as well as more discrete products such as the geodatabase prepared during the first part of the SMMNR project (See ABPmer, 2019). Such data catalogues will help developers to readily identify and source data and information relevant to their area of interest.

2.4 Deliverables

The key deliverables will include:

- Georeferenced broadscale habitat data covering targeted survey area(s);
- Constraints and opportunities maps covering each of the focus activities;
- Evidence packages for each identified resource area, or groups of identified resource areas covering each of the focus activities;
- A geodatabase incorporating each of the focus activities and providing available evidence for each identified resource area, or groups of identified resource areas.

The outputs will be presented in the format of a written report covering data collection, environmental constraints analysis, development of evidence packages and recommendations to support and assist sustainable development in Welsh waters.

All deliverables will be prepared in accordance with Welsh Government standards and the finalised version of the full report provided in English and Welsh.

2.5 Stakeholder Engagement

Stakeholder engagement is key to informing the deliverables of this project. This will be achieved through a variety of mechanisms as summarised in Table 1. In addition to the formal items identified in Table 1, more informal consultation will be ongoing throughout the duration of the project.

Table 1. Key stakeholder engagement events and meetings

Event	Programme - Frequency	Objective
Progress reporting	Monthly	Monitor project progress and risks.
Inception meeting with Welsh Government/NRW	20 March 2019	Project kick off meeting. Overview of project covering related SMMNR projects, data needs, constraints analysis, data collection and stakeholder engagement.
Interim review meetings with Welsh Government/NRW	Quarterly (next meeting scheduled for June 2019)	Monitor project progress and risks. Ongoing input to shape project deliverables.
Marine Planning Newsletter	Ongoing. Specific detail of SMMNR covered in Issue 7 (29 May 2019)	Present and summarise details of SMMNR. Provide updates on progress.
Marine Energy Wales conference	April 2019	Present details of the SMMNR project and seek further initial input from key stakeholders relating to SMMNR project and data collection exercise.
Shellfish Association of Great Britain annual forum	May 2019	Present details of the SMMNR project and seek further initial input from key stakeholders relating to SMMNR project. Gain further insights to current aspirations, limiting factors and opportunities.
Specific data requests issued/followed up	April/May 2019	Collation of data/information sources to inform early constraints mapping and target survey effort.
Early consultation with NRW technical leads	March/April/May 2019	Agreement and provision of key datasets, as considered by technical advisors/regulators, to inform early constraints mapping and benthic surveys.

Event	Programme - Frequency	Objective
Ongoing consultation with NRW technical leads	June-August 2019	To discuss and agree key datasets to inform environmental constraints analysis
Environmental constraints workshop	23 July 2019	One day NRW workshop to discuss methodology and key spatial data layers for constraints
Integrated approach meeting (constraints methodology and analysis)	August/September 2019	To discuss synthesis of overlapping constraints work between Cefas and successful contractor for GIS constraints methodology work package
Expert panel meeting	Early September 2019 (tbc)	Specifically to discuss constraints analysis work and initial outline of evidence packages
SRG meeting	04 September 2019	Communicate progress of SMMNR. Discuss constraints analysis work and initial outline of evidence packages
Environment Evidence 2019 conference	17-19 September 2019	To present work on SMMNR
Aquaculture Common Issues Group meeting	Autumn 2019 (to be confirmed)	Gain further insights to current aspirations, limiting factors and opportunities.
Bangor Shellfish Centre 2019	Winter 2019 (dates tbc)	Communicate work of SMMNR. Gain further insights to current aspirations, limiting factors and opportunities for this sector.
MEW conference 2020	Spring 2020	Communicate work of SMMNR. Gain further insights to current aspirations, limiting factors and opportunities for this sector.
Stakeholder dissemination event(s)	July 2020	Workshop/meeting(s) in Wales to share outputs and shape final deliverables i.e. evidence packages and guidance.

In early 2019, the key findings and recommendations from the first part of the SMMNR project were presented to stakeholders. Since award of the next part of the project, regular meetings have been held with NRW and Welsh Government to guide the progress of the work.

2.5.1 Inception meeting and data collection

At the inception meeting (20 March 2019) it was acknowledged that survey work to inform data collection on benthic features would need to be completed during summer 2019 to realistically meet project deadlines. Within the inception meeting it was agreed with NRW and Welsh Government that the survey work should focus on validating the presence and extent of reef features, and the discrimination of Section 7 habitat features. As the presence of such features will likely increase consenting risk for any of the focus activities, validation or indication of their presence and extent will contribute to the more detailed constraints analysis work as the project progresses.

To inform and direct the benthic survey work within the timescales, it was necessary to consider high-level constraints and opportunities to the surveys early within the programme. Key datasets were identified between ABPmer and NRW which would allow data collection locations to be determined

within Welsh waters (emails from Lee Murray (25 March 2019) and Kirsten Ramsay (01 April 2019)). Most of the datasets had been collated as part of the first stage of the SMMNR project and included:

- Designated sites;
- Article 17 features;
- Reef habitats;
- Tidal stream resource;
- Wave resource; and
- Draft SRA boundaries.

These datasets were supplemented by NRW with additional data layers, such as the extent of acoustic data within Welsh waters and the latest data on reef extent (10 April 2019). In addition to these, layers showing the extent of Seacams multibeam survey work in Welsh waters were provided by Bangor University (03 May 2019).

Utilisation of these datasets in the planning of the survey work allowed survey locations to be targeted (see Appendix A). Typically, the survey locations focussed on areas of suitable resource which overlapped designated sites, avoiding areas of known reef habitat and historic or planned multibeam surveys. The presence of reef habitat representing a high-level constraint to the development of focus activities and thus the survey work. A technical memo encompassing the early mapping work was then provided to NRW and Welsh Government (17 May 2019) before being discussed and agreed upon in late May (23 May 2019) (see Appendix A). A key outcome was the agreement that survey work should focus on broad geographical areas off the north-west coast of Pembrokeshire and to the west of Anglesey.

The requirement to carry out survey activities in summer 2019 precluded detailed stakeholder engagement exercises prior to commencement of the survey work. However, further detail on the SMMNR project, including the intended survey collection work, was communicated to stakeholders at the Marine Energy Wales conference (04 April 2019) and the Shellfish Association of Great Britain annual forum (14 May 2019), with feedback invited from stakeholders. Similarly, Issue 7 of the Welsh marine planning newsletter (May 2019) provided updates on the next stage of the SMMNR project, inviting stakeholders to respond with any queries.

2.5.2 Constraints analysis, evidence packages and project collaboration

Recognising the overlapping constraints analysis tasks required for related SMMNR project packages (see Section 2.2.2: Approach), meetings will be held with the relevant contractors and stakeholders to provide an integrated approach to the work and acknowledge feedback (see Table 1).

The approach to the environmental constraints methodology was discussed between ABPmer and Cefas, with agreement that ABPmer would lead on the development of the methodology (25 June 2019). In the quarterly meeting with NRW and Welsh Government that followed (25 June 2019), an environmental constraints workshop was arranged (23 July 2019). The input of NRW technical specialists will be used to agree the general approach (e.g. assumptions) and various steps within the constraints analysis methodology (e.g. impact pathways; feature sensitivity; key datasets; scoring). Although key datasets have yet to be agreed, it is understood that datasets encompassing Annex I habitats and Section 7 features are in the process of being updated by NRW.

Expert panels will be used to engage with specific stakeholders on the environmental constraints work and the development of the evidence packages (see below). Currently it is envisaged that these expert panels will be set up by early September 2019, allowing feedback on the constraints work and initial

outline of evidence packages. Further feedback will be sought during the SRG meeting (04 September 2019) at which the general progress of the SMMNR project will be communicated.

2.5.3 Wider engagement

As mentioned above., further engagement has taken place at the Marine Energy Wales conference (April 2019) and the Shellfish Association of Great Britain annual forum (May 2019) to outline the next part of the SMMNR project with key stakeholders.

ABPmer will attend the upcoming Environment Evidence 2019 conference (17-19 September) and have submitted an abstract, covering the SMMNR project, specifically targeted topic 'Sustainable Use of the Marine Environment' on the second day. Attendance is also planned for the Bangor Shellfish Centre 2019 (dates tbc) and MEW conference 2020.

The Welsh marine planning newsletter will continue to update stakeholders on the progress of the SMMNR project. It is also envisaged that through the Wales Marine Action and Advisory Group (WMAAG) progress on the SMMNR can be communicated to their members. There is also potential to promote specific tasks and outputs from the work through the MEDIN newsletter.

2.6 Programme

The detailed programme for completing the second part of the SMMNR project is outlined in Table 2. The programme includes an element of flexibility, particularly around stakeholder engagement and meeting/workshop dates, as these will be dependent on third party availability.

Allowances have also been made for potential delays to survey activity as a consequence of poor weather; however, all fieldwork should be completed by end of September 2019, with processing, analysis and interpretation of all collected data to be finalised in early 2020.

2.7 Risks

Several risks to the project and programme are acknowledged along with measures to mitigate their likelihood and impact.

The surveys (multibeam and drop-down video) have been planned to coincide with the most favourable annual weather periods, with work currently proposed for late July and August 2019. The nature of the multibeam work requires commitment to a given start date. In contrast, a degree of flexibility to the drop-down video survey will allow the survey to commence, and surveyors to be deployed, when a suitable weather window is presented.

Estimates of the likely range of weather down time (WDT) that that might be experienced during the multibeam survey at the selected locations have been created using the ABPmer Weather Down Time Express (WDTX) Service (https://www.seastates.net/weather-downtime-express/) . The service returns detailed statistics regarding the realistic range of potential WDT that might be experienced when attempting the project in the future, based on the statistics of what has happened in the past.

In terms of general timing the service predicted that the period of May to August were generally better months to carry out the work, with July generally the best of these months. WDT estimates increase rapidly for start date in September onwards. There is a greater likelihood of weather down time occurring during the Pembrokeshire survey due to the more exposed location and typically greater wave height.

Assuming that the vessel can accommodate a working wave height of 1.2 m if the relative direction of the seastate and the survey tracks allow, the following WDT is reasonably expected for a start date in July:

- 30% chance of no WDT, 40% chance of 1-3 days, 20% chance of 4-7 days, 9% chance of 7-15 days and 1% chance of 15-30 days.

A slightly reduced daily rate for the multibeam survey vessel has been negotiated for down weather days. Should unsuitable weather conditions be forecast prior to the survey commencing then staff will not be deployed until a suitable weather window is available. The survey lead will continually communicate with the skipper of the survey vessel to allow the survey plan to evolve according to sea conditions.

Although the offshore and exposed nature of the survey locations does not provide much opportunity for shelter from prevailing wind conditions, surveyors will seek to carry out work within the most exposed areas, being mindful of the effects of tide direction and speed, under the most clement weather conditions. This allows an adaptive approach to the survey, whereby areas affording slightly better working conditions will be surveyed as weather conditions deteriorate.

Under good conditions over flat areas of the seabed, the multibeam swath width can achieve five times the water depth. However, where the seabed has significant undulations or boulders the line spacing will need to be reduced to ensure full coverage. It is anticipated that the seabed within the broad search areas will be a mix of coarse uneven substrata with occasional areas of rocky outcrops. Hence, the survey plan for this work (see Appendix A) has assumed a multibeam swath width of three times the water depth to be conservative and thus achievable under suitable weather conditions.

There are several other connected pieces of work to the SMMNR project which overlap; in particular, those pieces of work covering constraints methodology and analyses i.e. 'environmental constraints analysis for the aggregate sector' and 'GIS mapping and constraint methodology'. The production of evidence packages is also a requirement for other pieces of SMMNR related work.

Recognising the different timescales for these projects and the similar or matching outputs required, it is important that clear communication channels are established with the other contractors (see Section 2.2.2 and 2.5.2). As a first step to managing the risk, ABPmer has brought forward the development of the constraints methodology to align with other SMMNR packages (see Section 2.2.2) with this work commencing in late June (see Table 2). Provision has also been made for regular meetings (see Table 1 and Table 2). Although the 'GIS mapping and constraint methodology' work has yet to be awarded, a kick-off meeting with the 'environmental constraints analysis for the aggregate sector' contractor (Cefas) took place on 25 June 2019 (see Section 2.5.2) to discuss the development of the environmental constraints methodology.

A key risk at the final stages of the project will be stakeholder uptake to the constraints mapping and evidence plans. Early engagement with relevant stakeholders and expert panels will manage this risk by allowing opportunities for the key outputs to be discussed at an initial stage within their development. Within the programme, provision is made for meetings with an expert panel and the SRG in September (see Table 2), at which time the outputs from the environmental constraints workshop and the developing methodology can be discussed. These early meetings will also provide an initial opportunity to discuss the content, style and format of the evidence packages.

It is assumed that translation of the final deliverables will take up to two months; however, this is dependent on the number of final deliverables.

Table 2. Programme

Task	2019											2020										
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Contract award	11-Feb																					
Contract start date	26-Feb																					
Inception meeting		20-Mar																				
Inception report			01-Apr																			
Monthly progress report																						
Development of work plan																						
Attendance at MEW conference			04-Apr																			
Early constraints mapping to inform survey																						
Attendance at SAGB conference				14-May																		
Meeting/agreement on survey locations (NRW and WG)				23-May																		
Detailed work plan (draft)					14-Jun																	
Detailed work plan (final)					15-July																	
Constraints methodology kick-off meeting with Cefas					25-Jun																	
Interim review meeting in London					25-Jun																	
Ongoing informal stakeholder engagement																						
Data collection planning/fieldwork (multibeam and ecology surveys)																						
Developing constraints methodology (collaboration with Cefas)																						
Environmental constraints workshop (NRW)						23-Jul																
Constraints approach meeting– successful methodology contractor and Cefas									Tel conf													
Data processing (multibeam)																						
Expert panel meeting								w/c 2-Sep														
Quarterly marine planning SRG meetings								4-Sep														
Environment Evidence Conference (Swansea)								17-19 - Sep														
Interim review meeting (Bangor/London)								w/c 2-Sep			w/c 16-Dec			w/c 16-Mar			w/c 15-Jun					
Data analysis and interpretation																						
Broadscale habitat maps																						
Survey report												17-Jan										
Constraints and opportunities mapping																						
Recommendations on resource use																						
SRA guidance																						
Evidence packages																						
Attendance at MEW conference																						
Geodatabase update and development																						
Stakeholder workshop - dissemination/ recommendations																						
Final report																						
Final meeting in Bangor																				w/c 14-Sep		
Welsh translation																						
Contract end																						

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4 Abbreviations/Acronyms

AIS	Automatic identification system
Cefas	Centre for Environment, Fisheries and Aquaculture Science
DAS	Design and Access Statement
DDV	Drop-Down Video
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EMFF	European Maritime and Fisheries Fund
EN	Energy
EU	European Union
GES	Good Environmental Status
GIS	Geographic Information System
HLMO	High Level Marine Objectives
HM	Her Majesty's
HRA	Habitat Regulations Assessment
IHO	International Hydrographic Organization
IMP	Integrated Maritime Policy
ISO	International Organization for Standardization
LPA	Local Planning Authority
MCAA	Marine and Coastal Access Act
MEDIN	Marine Environmental Data and Information Network
MEECE	Marine Energy Engineering Centre of. Excellence
MESH	Mapping European Seabed Habitats
MEW	Marine Energy Wales
MPA	Marine Protected Areas
MPS	Marine Policy Statement
MSP	Maritime Spatial Planning
NRP	Natural Resources Policy
NRW	Natural Resources Wales
NRW-PS	NRW Permitting Service
OBIS	Ocean Biogeographic Information System
ORJIP	Offshore Wind, Offshore Renewable Joint Industry Project
SAGB	Shellfish Association of Great Britain
SEA	Strategic Environmental Assessment
SMMNR	Sustainable Management of Marine Natural Resources'
SRA	Strategic Resource Areas
SRG	Scientific Review Group
TAN	Technical Advice Note
tbc	To Be Confirmed
TCE	The Crown Estate
UK	United Kingdom
WBFG	Well-being of Future Generations
WDT	Weather Down Time
WDTX	Weather Down Time Express
WFD	Water Framework Directive
WG	Welsh Government
WGS84	World Geodetic System (1984)

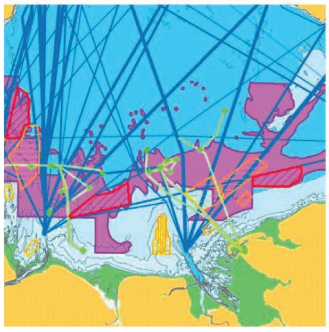
WMAAG	Wales Marine Action and Advisory Group
WMPP	Wales Marine Planning Portal
WNMP	Welsh National Marine Plan

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Appendices




Innovative Thinking - Sustainable Solutions

ABP mer

A Early Constraints and Opportunities

To stimulate discussion pertinent to the selection of suitable survey areas a technical memo was provided to NRW and Welsh Government (17 May 2019). The contents of this document were discussed on 23 May 2019 between Welsh Government; NRW and ABPmer. It was concluded that survey work should be carried out off the west coast of Anglesey and at Pembrokeshire.

Technical Memo (17 May 2019):
Sustainable Management of Marine Natural Resources: Work Package 2

1. Introduction

Effective marine spatial planning requires good quality evidence that can be used to inform decision-making. To help meet this requirement, the 'Sustainable Management of Marine Natural Resources' (SMMNR) project, funded by the European Maritime and Fisheries Fund and Welsh Government, is developing the environmental evidence base in relation to tidal stream energy, wave energy and aquaculture resources in the Welsh marine area. In particular, the project is examining how use of these resources may affect marine protected areas (MPAs) and other sensitive species and habitats, and identifying opportunities for sustainable development.

The SMMNR project is intended to increase understanding of the marine environment and to develop plans that provide sufficient local specificity and data against which benefits of marine planning can be understood and demonstrated. The project will do this through the consideration of relevant and available datasets, analysis and interpretation of biological, chemical and physical data, in addition to gathering new evidence that specifically relates to the focus activities and areas of identified suitable resource.

Thus, the project will address key knowledge gaps in marine planning such as the carrying capacity (i.e. environmental limits) of identified resource areas for the intended activity and specific areas of particular sensitivity or opportunity at the local scale. The end point of the project will be the production of evidence packages applicable to resource areas associated with each of the activities. These packages will provide information on constraints and opportunities, locational guidance, spatial data and links to relevant research. Consultation with stakeholders will help to inform the format and guidance within these packages to ensure that their benefit is maximised.

Work has been completed to collate and quality assess over 420 datasets covering physical, chemical, biological and human environment data relevant to tidal stream energy, wave energy and aquaculture activities. Data were quality assessed against attributes including appropriateness, methodology and accuracy. Data assessed as high quality with high confidence were considered important for informing marine spatial planning of tidal stream energy, wave energy and aquaculture in Welsh waters. Following collation and review of relevant data, recommendations were made on how evidence and data gaps could be addressed, including through targeted studies (ABPmer, 2019). A key recommendation was to collect further benthic data and so enhance the development of consistent quality benthic habitat maps across identified resource areas. These maps can then be used to inform locational guidance.

This technical memo has been prepared by ABPmer as an initial step to the data collection activities. Selection of suitable geographical locations for benthic survey work (broad search areas) through prioritisation of evidence requirements, will allow survey effort to be maximised within the project programme and budget.

Hence, this memo provides information on the early constraints analysis and the rationale for selection of these broad search areas. Information is also provided on the survey methodology with practical consideration of the data collection achievable. The memo concludes with a breakdown of potential survey options for further discussion. The field data collection provided by these options will address gaps in the physical and biological benthic datasets within the geographical region(s) of interest, acknowledging feature sensitivity to the pressures from focus activities and informing spatial planning.

Cronfeydd Strwythurol a Buddosoddi Ewropeaidd
European Structural and Investment Funds

2. Early constraints and opportunities

The selection of broad search areas for the data collection exercise requires a strong rationale through the consideration of clearly identifiable environmental constraints and opportunities. Early prioritisation was first afforded to broad search areas that would maximise evidence collection i.e. those areas where data could be gathered which were potentially relevant to multiple activities, with acknowledgment to identified resource areas. At this stage the draft Strategic Resource Areas (SRAs) as presented in the draft Welsh National Marine Plan (WNMP) (see Figure 1) were used as a basis for the search areas but recognising that these areas are only indicative. To further rationalise the broad search areas a step process was then applied which initially considered high-level easily identifiable environmental constraints within broad survey areas. These areas were then further reduced in extent following selection of the key search features, subsequent survey methodology and consideration of data availability (see Figure 1).

Early prioritisation

To maximise the value of evidence obtained, preference was given to broad and achievable search areas that overlapped with potentially suitable resource for one or more focus activities. Where there was reasonable scope for a search area to encompass more than one focus activity then these areas were prioritised. The location of the draft SRAs were used as a starting point for this stage; however, it was acknowledged that the boundaries of the draft SRAs would not constrain survey extent. Acknowledgment was also given to Bardsey Sound, which is recognised as an area of good tidal stream resource.

Wave energy resource is maximised to the south western margins of Welsh territorial waters, with the best areas considerably further offshore than those initially considered for the other focus activities. Hence, following the initial prioritisation process, potential broad search areas were reduced to those which reasonably captured both tidal stream and aquaculture resource:

- Pembrokeshire - off St David's Head and around Ramsey Sound,
- Llyn Peninsula - around Bardsey Sound,
- North Anglesey – along the north coast of Anglesey
- West Anglesey – off the west coast of Anglesey

All these areas contain good tidal stream resource, adjacent or near to the draft aquaculture SRAs identified in the draft WNMP.

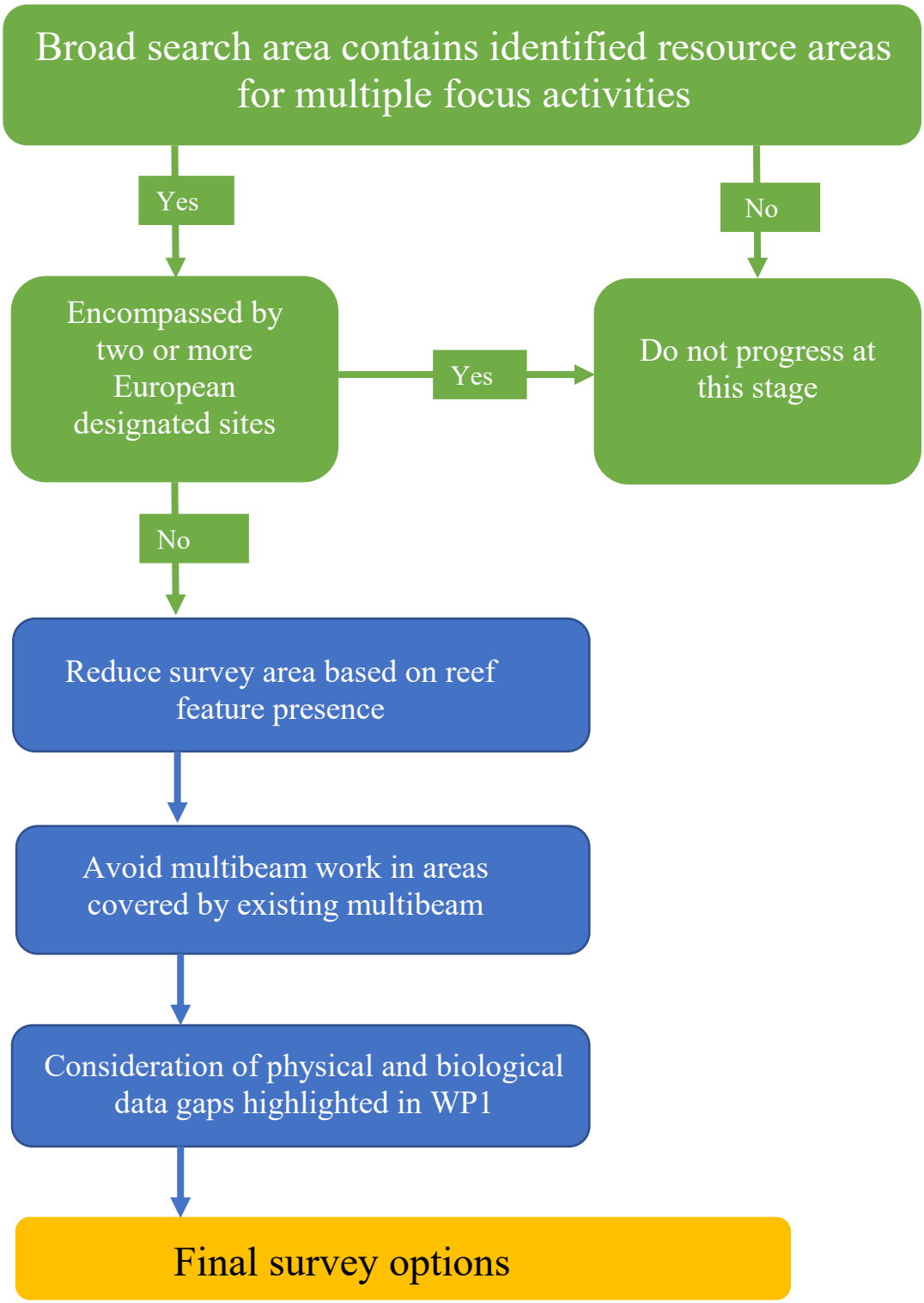


Figure 1: Step process to identification of early constraints and opportunities for broad survey site selection. Green - early prioritisation; blue –rationalisation of survey site area.

High-level environmental constraints

A large proportion of Welsh waters are encompassed by European designated sites (SACs and SPAs). As a first step to the early constraints analysis, consideration was given to the number of European designated sites which overlapped with the broad search area and the degree of overlap where this occurred. The overlap with draft tidal stream SRAs were used as a starting point for this stage; however, it was acknowledged that the boundaries of the draft SRAs would not constrain survey extent.

It is recognised that the presence of two or more designated sites would not necessarily preclude development of any focus activity, as this depends very much on the features encompassed by these sites and their sensitives to particular pressures. However, for the purposes of this high-level analysis, it has been assumed that there is greater potential for consenting risk as overlap with designated sites and features is increased.

Where other environmental constraints were easily identified, such as the presence of Article 17 habitats (e.g. reef features), then these were also acknowledged.

North Anglesey
Areas of good tidal stream resource off the north coast of Anglesey are largely encompassed by the North Anglesey Marine SAC and Anglesey Terns SPA with an important seal haul-out area at the Skerries. The draft tidal stream SRA at this location is completely encompassed by these two European sites. Annex I reef habitat floors much of the draft tidal stream SRA while the North Anglesey coastline forms part of the Anglesey Area of Outstanding Natural Beauty (AONB).

West Anglesey
Areas of good tidal stream resource off the west coast of Anglesey overlap with the North Anglesey Marine SAC and Anglesey Terns SPA. A comparatively small area of the draft tidal stream SRA at this location overlaps with two European sites; however, just less than half of the draft tidal stream SRA does not overlap with any European site. Patches of reef habitat are located within the draft tidal stream SRA. This broad search area contains the only draft tidal stream SRA which is not fully encompassed by at least one designated site.

Bardsey
The area around Bardsey Sound is encompassed by three European designated sites: West Wales Marine SAC; Pen Llyn a r Sarnau/Lleyn Peninsula and the Sarnau SAC; Aberdaron Coast and Bardsey Island SPA. Much of the area is also located within the nationally designated heritage coast and forms part of an AONB. There is also extensive reef habitat throughout the area as identified from the Article 17 habitat mapping dataset.

Pembrokeshire
The final recommendations within the first phase of work detailed a number of clearly identifiable environmental constraints for development of focus activities around Ramsey Sound, which is encompassed by West Wales Marine SAC (designated for harbour porpoise), Pembrokeshire Marine SAC (designated for Annex I habitats including reefs), Ramsey Island NNR, Ramsey SSSI and Pembrokeshire Coast National Park (see ABPmer, 2019). There are also a number of seal pupping haul-out sites in the area, while the sound is also an unusual feature in its own right, there being only two other sounds in Welsh waters. Subtidal 'reefs' and 'large shallow inlets and bays' are primary reasons for designation of the Pembrokeshire Marine SAC and Article 17 habitat mapping data suggests that much of the seabed around Ramsey Sound is floored with reef habitat and the area from Ramsey Island landward encompassed by the feature 'large shallow inlets and bays'.

However, to the north of Ramsey Sound, off St David's Head, the environment is less geographically constrained but still subject to strong tidal streams. Beyond the northerly extent of the Pembrokeshire Marine SAC there is also a large area of the draft tidal stream SRA that only overlaps with the West Wales Marine SAC. Habitat mapping data does not currently identify any Article 17 habitats to the north of St David's Head, with a broad expanse of mixed sediment habitat thought to be present.

Only the broad search areas at West Anglesey and Pembrokeshire contained regions of the seabed with identified tidal resource that were not encompassed by two or more European designated sites. Hence, from this high-level environmental constraint analysis, the potential broad search areas were reduced to an area north of St David's Head off Pembrokeshire, and an area to the west of Anglesey.

Search features

The presence of certain benthic features, such as Annex I and Section 7 habitats, increases consenting risk for marine developments. Determining the presence/absence of these features will be a key objective of the benthic survey work.

Areas of identified tidal stream resource are characterised by highly energetic environments, the result being habitats predominantly defined by coarse substrata or scoured rock. Reefs are an Annex I feature of the EU Habitats Directive, recognised as a feature of conservation importance. Reefs encompass rocky, stony and biogenic features, all of which are found in Welsh waters. At a high-level, identifying the presence/absence of 'reef' features provide an indication of a key environmental constraint for development of the focus activities.

To maximise survey effort and coverage a key focus of the data collection work will be the identification of reef features allowing greater confidence in presence and extent. However, to further refine the broad search areas where confidence (as defined by NRW habitat mapping) in the presence of reef features is good, these areas will be avoided, thus reducing the overall survey area.

Broad methodology

Use of multibeam backscatter provides a quick and reliable method for characterisation of broad benthic features such as 'reef' when supplemented with groundtruthing. This will allow presence/absence of reef habitat to be identified and therefore broad habitat mapping with a high degree of confidence. Presently, maps of Annex I reef habitat in Welsh waters comprise both high confidence reef data (where survey data is available to verify the records) and potential reef feature derived from habitat modelling.

The use of a multibeam echosounder provides swath coverage of the seafloor, proving high resolution coverage of width that increases with water depth. Such methods can produce full seafloor coverage. The instrument is vessel-mounted and therefore the positioning of seabed features can be identified to a high degree of accuracy. Discrimination of broad benthic feature types will then be groundtruthed using drop-down video (DDV). As the focus is to determine presence/absence of reef habitat and to identify the type of reef present, benthic grabs will not be used.

Multibeam survey locations will avoid areas of the seabed where multibeam survey is already known to have been carried out. However, consideration will be given to DDV groundtruthing of these areas if interpretation and benthic mapping from the multibeam has not been carried out. For example, multibeam data collected under the Civil Hydrography Programme could be usefully groundtruthed if it overlaps with broad search areas

An indication of historic multibeam survey extent was initially provided by NRW. Multibeam survey work used to inform commercial projects was also acknowledged (e.g. the geographical extent of data collected by Seacams). Although detailed data from commercial surveys are not always publicly available, provided the survey extent of the multibeam activity is known then the area covered by these surveys can be avoided.

Data availability

Relative densities of high-scoring physical and biological data across Welsh waters have been identified, enabling areas of comparatively lower amounts of available and relevant data to the focus activities, to be highlighted (ABPmer, 2019).

Greater survey priority was afforded to those areas which the data collation exercise had shown were comparatively lower in high-scoring physical and biological data.

Search Areas

Through consideration of the high-level environmental constraints two broad search areas were identified, north and north-west of St David's Head (Pembrokeshire) and to the west of Anglesey (West Anglesey) (see Figure 2 and 3).

Pembrokeshire
Following consideration of search features, methodology and data availability the potential survey area will encompass an area of 95.3km^2, of which approximately 75.2km^2 overlaps with draft tidal stream SRAs and 10.9km^2 overlaps with draft aquaculture SRAs, as outlined within WP1.

All of the potential survey area falls within the West Wales Marine SAC (designated for harbour porpoise) and Pembrokeshire Marine SAC (designated for Annex I habitats including reefs); however, habitat mapping indicates limited overlap with Article 17 reef features.

West Anglesey
Following consideration of search features, methodology and data availability the potential survey area will encompass an area of 83.9km^2, of which approximately 61.7km^2 overlaps with draft tidal stream SRAs.

A portion of the survey area (22.2km^2) sits outside any designated site; however, habitat mapping indicates that some of the survey area is characterised by possible reef habitat.

Rationalisation

It is acknowledged that a focussed survey programme in one broad search area would provide a greater amount of suitable high-quality data, as compared to dividing survey effort between two broad and geographically distinct search areas (i.e. Pembrokeshire and Anglesey). However, it is considered that encompassing two areas would increase the overall value of the data collection exercise and be perceived more positively by stakeholders.

Survey work off St David's Head would encompass large areas of suitable resource for both tidal stream and aquaculture, as illustrated through the location of the draft SRAs in WP1. Habitat mapping data indicates that the survey area will likely overlap with reef feature along the southern and western margins; however, a large

expanse of mixed sediment feature is suggested over much of the survey area by admiralty chart data and the bathymetric uniformity of the seabed.

While the proposed multibeam survey within the West Anglesey search area overlaps with good tidal stream resource, there is no overlap with aquaculture resource areas, as defined by location of draft aquaculture SRA. However, it is proposed that DDV groundtruthing is also carried out within an area of existing multibeam survey overlapping with the large draft aquaculture SRA to the west of Anglesey and adjacent to the proposed multibeam activity. The seabed to the west of Anglesey is likely to encompass areas of coarse sediment, stony and rocky reef.

3. *Detailed methodology*

This section provides an outline of the survey methodology and proposed plan for data collection using multibeam and DDV. Consideration of the detailed methodology allows a prediction of data collection achievable within each broad search area. Subsequent to this, a series of options are then provided (see Final Survey Options).

Bathymetry and Backscatter Survey

It is envisaged that this work will be carried out from FPV Morven. This vessel has 24hr working capability and is permanently mobilised with a Kongsberg 2040C dual head, dual swath multibeam bathymetry system, interfaced with an Applanix POS MV Oceanmaster inertial navigation system.

The multibeam and backscatter data will be acquired with a real-time positioning accuracy to within 0.2 m. However, positioning accuracy will be significantly improved during post-processing.

Backscatter
During acquisition, in order to ensure the highest quality backscatter, the multibeam pulse length will be kept consistent throughout survey. Tests have confirmed that altering the pulse length during acquisition will induce artefacts in the backscatter dataset. The data will be imported to Caris HIPS and SIPS 11.1. The processed SBET navigation file will be applied to improve the horizontal positioning of the backscatter dataset. A backscatter mosaic will be created that can then be exported for seabed classification interpretation.

Bathymetry
Caris HIPS and SIPS 11.1 will also be used to process the multibeam bathymetry data. The raw bathymetry files will be loaded into the software where the processed SBET navigation file will be applied reducing the data to the required datum.

The relevant SVP file will be applied correcting the data for the effects of a changing sound velocity through the water column. Filters will be applied to remove any soundings that fall outside of the IHO Order 1a allowance, before further cleaning is conducted manually to achieve a high-quality final dataset.

Plan
The survey vessel will be operating 24 hours in order to achieve the greatest data coverage within the available budget. Multibeam coverage is dependent on vessel speed and water depth. With a greater water depth, the multibeam swath width is increased.

As an optimistic estimate under ideal weather conditions, experience demonstrates that 140 km of survey lines can be achieved per 24-hour day.

The expected multibeam swath width can be approximated by:

Swath Width = 3 x Water depth

Therefore, in an average water depth of 40m, we can expect a multibeam coverage of 120 m width along each survey line.

Using these figures, 140km of 120m wide survey lines would achieve a total multibeam coverage of 16.8km^2 per 24-hour day.

At each of the two broad search areas, proposed multibeam areas have been assigned a priority. At each site, Priority Area 1 has the largest comparative area, is the closest inshore and has the greatest degree of overlap with identified tidal stream resource (see Figure 1 and 2)

On arrival, the multibeam survey vessel will commence operations in Priority Area 1, and on completion move to Priority Area 2. The table below provides the areal coverage (km^2) of every Priority Area at each broad search site along with an estimate of the number of survey days required to complete.

Location	Priority	Area (km^2)	Estimated survey days
Pembrokeshire	Area 1	40	2.5
Pembrokeshire	Area 2	16.5	1
Pembrokeshire	Area 3	19	1.25
Pembrokeshire	Area 4	9	0.5
Pembrokeshire	Area 5	10.5	0.75
West Anglesey	Area 1	41	2.5
West Anglesey	Area 2	15	1
West Anglesey	Area 3	18.5	1.25
West Anglesey	Area 4	9.5	0.75

During the survey, the extent and location of collected multibeam data will be visible. This will mean that overlap with existing data will be kept to a minimum, while also reducing the likelihood of gaps between the survey data and that already collected.

Some processing of data will take place during the survey. This will allow modifications to be made to the survey plan and also inform the locations for subsequent groundtruthing by DDV.

DDV

A vessel has not yet been commissioned for the work; however, it is likely that the vessel would mobilise from Fishguard or Holyhead, at Pembrokeshire and Anglesey respectively.

Plan

This work will take place following completion of the multibeam survey. Unlike the multibeam work, the DDV survey will be highly constrained by tidal conditions. To maximise data collection the survey will be carried out around neap tides. This should allow an operational window of 1.5 hours, or more, either side of neap high/low tide.

As a conservative estimate an allowance is given for a 3-hour window twice a day, providing a maximum of 6 hours of survey time in any given day.
The key objective of the DDV survey will be groundtruthing of the multibeam data in Priority Area 1, with DDV locations directed by the multibeam requirements; enabling good quality habitat maps with high confidence. However, it should be acknowledged that it will not be possible to groundtruth some areas encompassed by the multibeam due to various constraints on this activity (e.g. tidal states, distance to survey stations etc.)
In addition, several Areas of Interest have also been identified at Pembrokeshire and West Anglesey. These will be a secondary focus of the DDV activity (see below for further detail on each). Some of these areas overlap with existing multibeam survey areas which have either not been groundtruthed or where additional groundtruthing in a broadly similar area would provide greater confidence in a potential feature of interest (e.g. presence of reef, type of reef, high energy habitats).

Once on station the DDV will be deployed for approximately 10 minutes, providing roughly 5 minutes of bottom time. Selection of stations will be dependent upon groundtruthing needs but also be informed by the footage observed. Hence, if a feature of interest (e.g. reef features; Section 7 habitat) is recorded then the DDV survey will be modified to allow an indication of feature extent.

Under optimum conditions and allowing for transit times between DDV stations, it is envisaged that up to 24 DDV stations can be surveyed each day at Pembrokeshire and, due to the slightly increased depth, 20 DDV stations at Anglesey.

Pembrokeshire
It is anticipated that the survey vessel will mobilise from Fishguard each day. Transit to/from the broad survey site to Fishguard will take approximately 2 hours. Consequently, it is unlikely DDV would be achievable within Priority Areas 4 and 5.

Four Areas of Interest are identified in Figure 2. From north to south:

1) This area runs along the base of a large sand bank feature
2) This is located within an area of high tidal stream resource @ 1.5m/s and overlaps with a draft tidal stream SRA and draft aquaculture SRA.
3) This area is comparatively close inshore, overlapping with a draft tidal stream SRA and draft aquaculture SRA. Lobster and king scallop fishing occurs in the area, suggesting bedrock reef and rocky outcrops.
4) Overlapping with Seacams multibeam data, it is thought that this area will overlap with continuation of reef feature

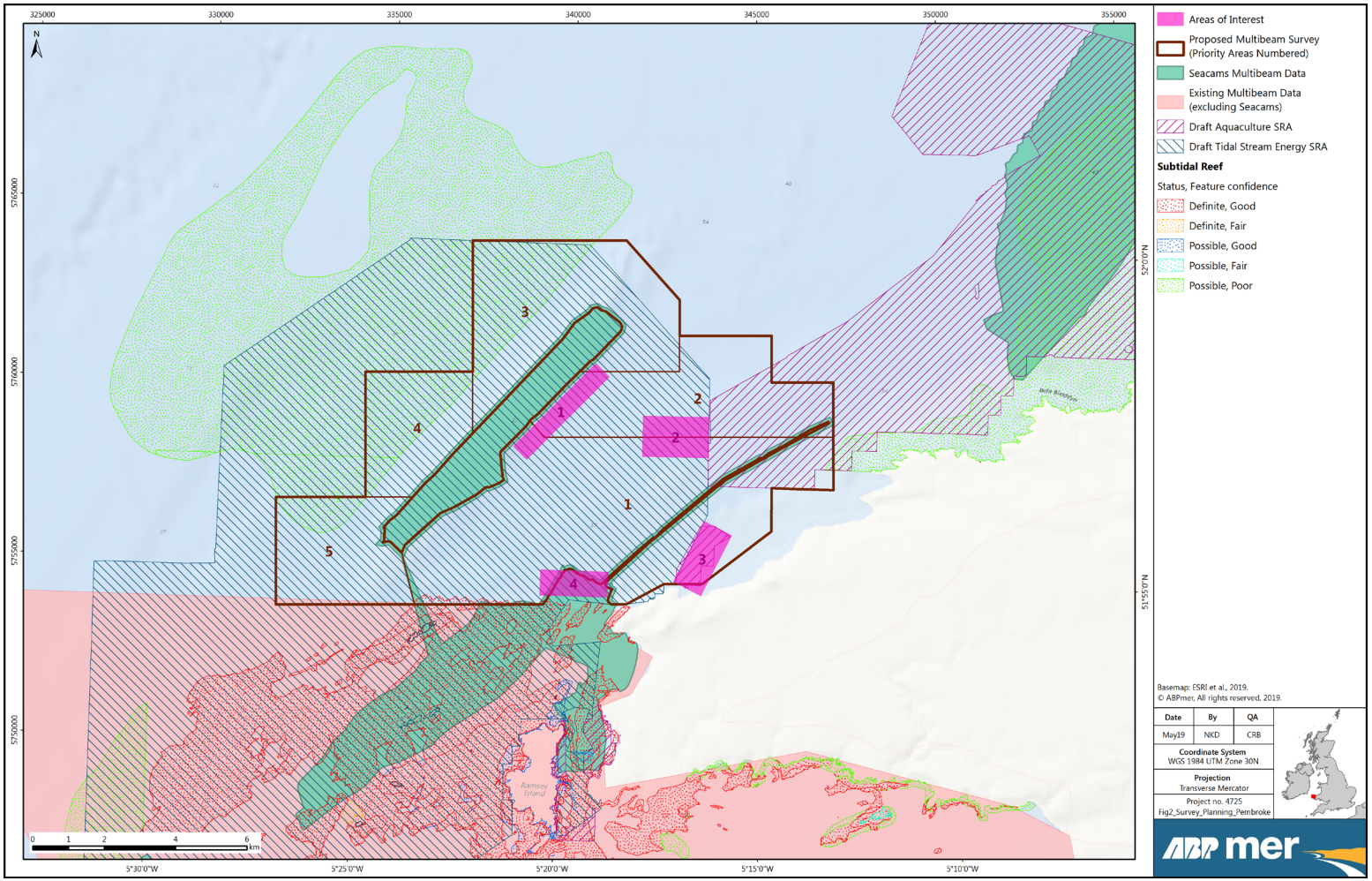


Figure 2: Proposed broad search area for Pembrokeshire

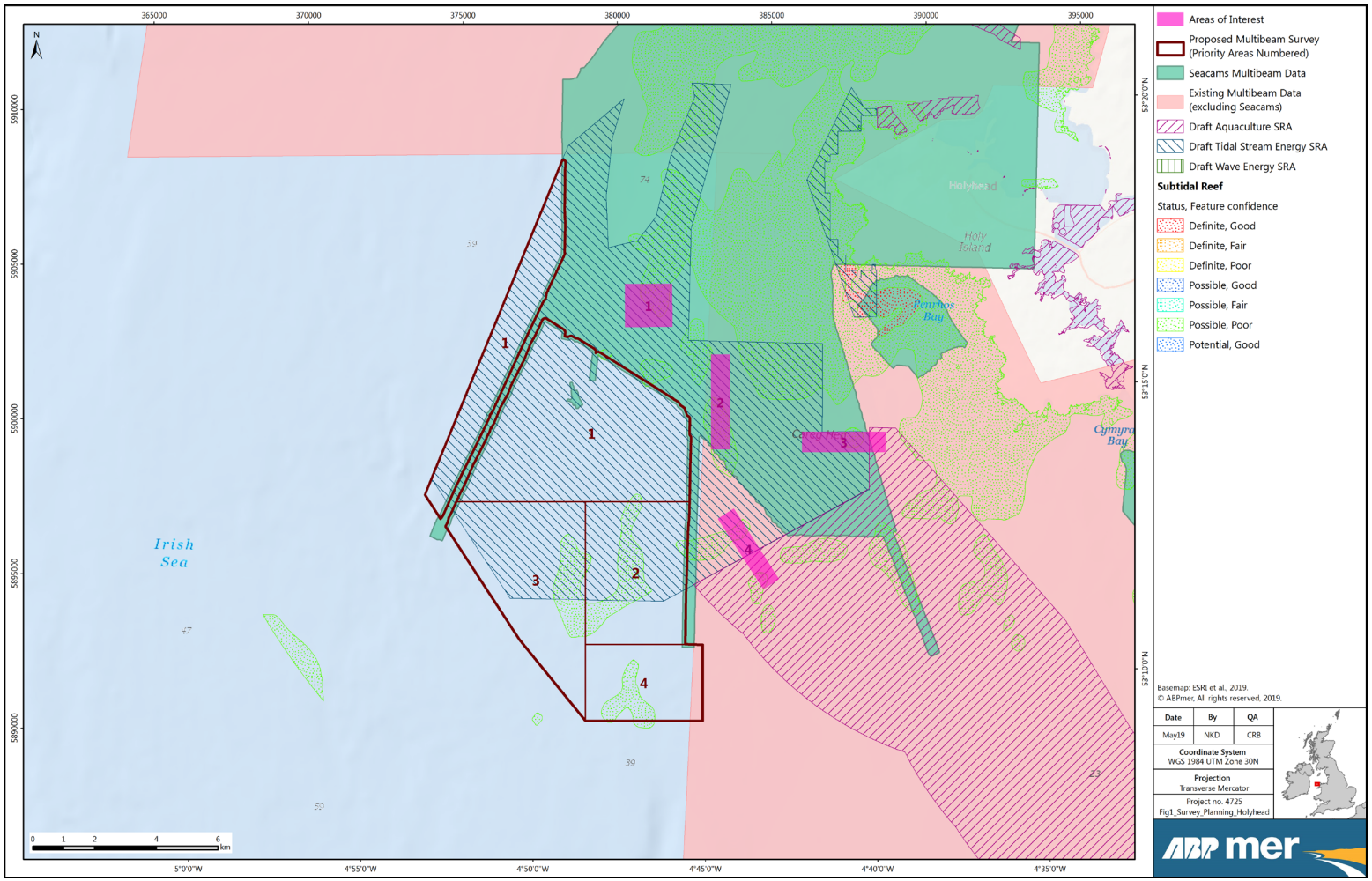


Figure 3: Proposed broad search area for West Anglesey

West Anglesey
It is anticipated that the vessel will mobilise from Holyhead marina each day. Transit to/from the survey site will take approximately 1.5 - 2 hours. Consequently, DDV work within Priority Area 3 will be very limited, and no DDV is proposed within Priority Area 4.

Four Areas of Interest are identified in Figure 3. From north to south:

1) This overlaps with areas of very high tidal streams
2) This area is within the SAC and SPA boundaries and located in an area where predictive mapping has assessed reef as possible but with poor confidence. Hence, confirmation of reef presence/absence would be useful.
3) Although this sits outside the proposed multibeam survey area and is within an area with existing multibeam data, consideration is given to carrying out just DDV survey work to increase confidence in predicted reef presence. This area also overlaps with a draft aquaculture SRA.
4) This area overlaps with the draft tidal stream SRA and draft aquaculture SRA. It is located within a marine SPA in an area where predictive mapping has assessed reef as possible but with poor confidence. Hence, confirmation of reef presence/absence would be useful.

4. Final Survey Options

This section acknowledges the detailed methodology and plan, considering the data acquisition that is reasonably achievable under the following three options:

- Data collection north and north-west of St David's Head (Pembrokeshire)
- Data collection to the west of Anglesey (West Anglesey)
- Data collection north and north-west of St David's Head and to the west of Anglesey (Pembrokeshire and West Anglesey)

Option 1 – Pembrokeshire
Under optimum conditions it is anticipated that all Priority Areas (1-5) could be surveyed by multibeam, with groundtruthing of Priority Areas 1-3 and DDV within the Areas of Interest.

Option 2 – West Anglesey
Under optimum conditions it is anticipated that all priority areas (1-4) could be surveyed by multibeam, with groundtruthing of Priority Areas 1, 2 and part of 3. DDV would also be achieved within the Areas of Interest.

Option 3 – Pembrokeshire and West Anglesey
Allowing half day transit between the broad search areas it is anticipated that under optimum conditions all of Priority Area 1 at each search area (~40km^2 at Pembrokeshire; ~41km^2 at Anglesey) could be surveyed by multibeam. Subsequent groundtruthing of Priority Area 1 at each broad survey area is also achievable. It is anticipated that DDV would also be possible at the Areas of Interest within each broad search area.

5. *References*

ABPmer, (2019). Sustainable Management of Marine Natural Resources, Work Package 1, ABPmer Report No. R.3065. A report produced by ABPmer for Welsh Government, February 2019.

B Evidence Package Template (Draft)

Sustainable Management of Marine Natural Resources (SMMNR)		
Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)

Purpose

As part of the SMMNR project, this evidence package has been produced to support marine environmental protection and sustainable use of Welsh marine resources. Following engagement with stakeholders this package has been designed to aid regulators and developers to understand the high-level constraints and opportunities to **tidal stream** development. This package (no. X) covers a broad geographical area encompassing tidal stream resource around Ramsey Island and St. David's Head, Pembrokeshire (see Figures X and Y)

Welsh Overview of Identified Resource: Tidal Stream

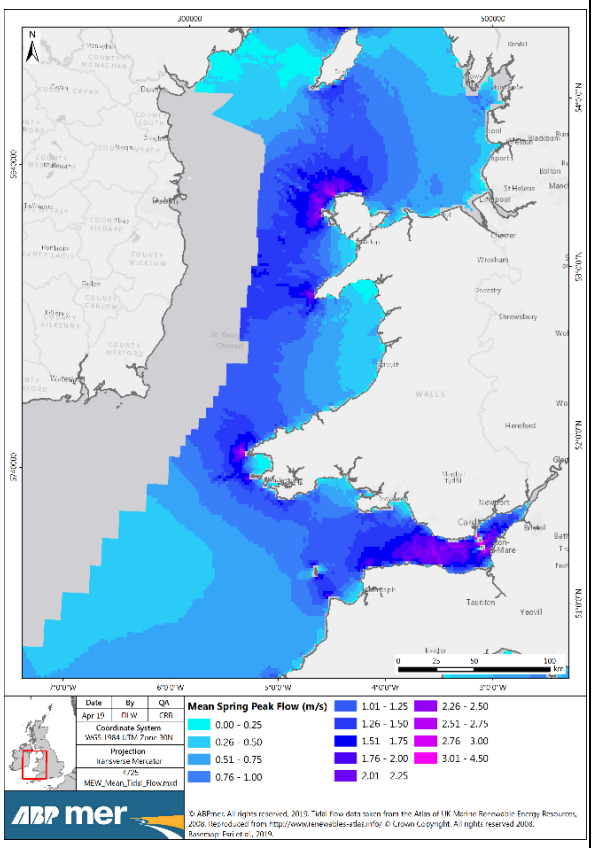


Figure X. Overview

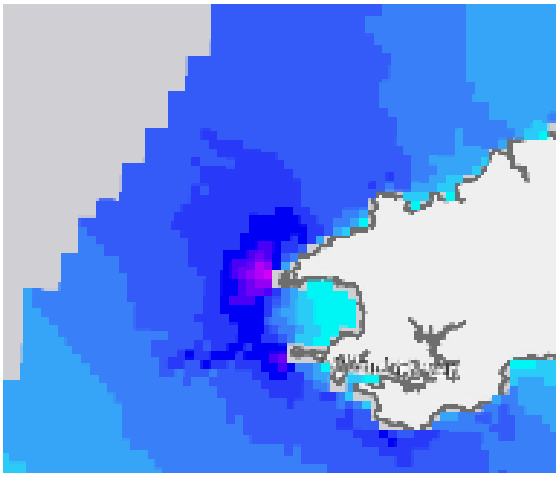
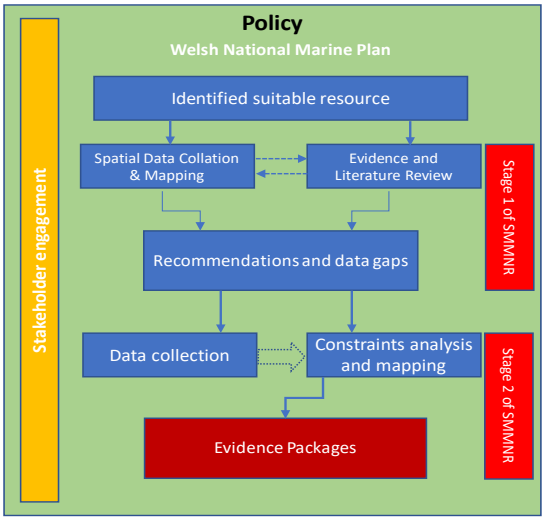


Figure Y. Inset
(numbered insets would allow users to see which area corresponds to package)

Sustainable Management of Marine Natural Resources (SMMNR)

Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)

SMMNR Approach (Flow Chart) –



Inc. summary text detailing process steps

FLOW Chart - evidence package

Planning Policy and Legislation

- National:
  - National Policy Statements
  - EN-1 and EN-3
  - UK Marine policy
- Welsh:
  - Welsh marine policy
  - WNMP – relate to policies
  - WBFG Act 2015
  - Environment (Wales) Act 2016
  - Natural Resources Policy
  - Planning Policy Wales -Edition 9 (Nov 2016)
  - TAN 5 (Nature Conservation and Planning)
  - TAN 14 (Coastal Planning)
  - TAN 18 (Renewable Energy)
- Regional:
  - Pembrokeshire Coast National Park Local Development Plan (September 2010) (see area PM4 for overlap with identified resource area for tidal stream) – Policy 33 – Renewable Energy

Sustainable Management of Marine Natural Resources (SMMNR)		
Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)

Guidance

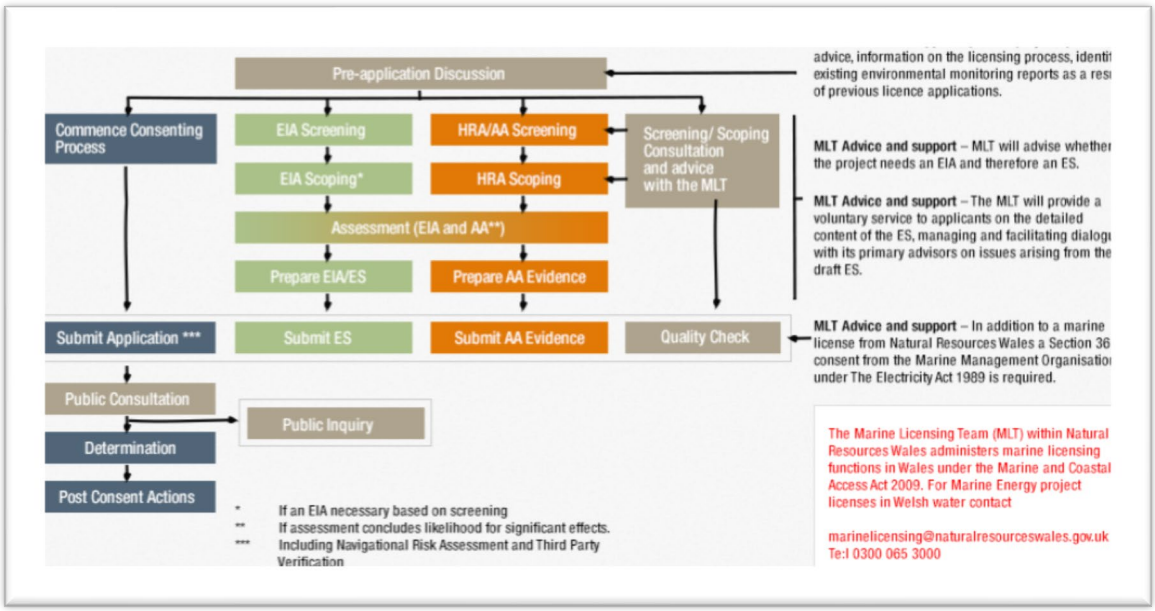
- Marine Planning:
  - Welsh Marine Planning Portal
- Marine Works (Environmental Impact Assessment) Regulations 2007 ("the EIA Regulations").
- The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017
- Marine Licensing -MCAA 2009 (marinelicensing@naturalresourceswales.gov.uk)
- Guidance on assessing offshore renewables/aggregates/aquaculture:
  - GN006 Marine ecology datasets for marine developments and activities
  - GN013 - Scoping an Environmental Impact Assessment for marine developments
  - GN030 - Assessment guidance for marine developments and activities
- Cabling sensitivity guidance- TCE/NRW –

Consenting

- Consenting and permitting requirements:
  - MCAA – marine licences (administered by NRW-PS) (link to
  - Planning permission (LPA)
  - S36 Electricity Act (Welsh Govt – Planning inspectorate)
  - Crown Estate Lease
  - Navigational Safety and Aids to Navigation
- To support applications:
  - EIA
  - HRA
  - WFD
  - Design and Access Statement (DAS)

Sustainable Management of Marine Natural Resources (SMMNR)

Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)



Source: http://www.marineenergywales.co.uk/developers/consenting-guidance

Identified Resource

- Refer to Figure X.
- Links to work identifying resource
- Link to data collation work – geodatabase (regularly updated)
- Link to WMPP - http://lle.gov.wales/apps/marineportal/
- Key datasets for resource:
  - Mean spring peak flow - https://www.renewables-atlas.info/

Spatial Constraints and Mapping

Constraints analysis methodology (link):

- Caveats – data limitations, requirement for baseline data collection, broad indication of consenting risk only (one part of wider process).

Sustainable Management of Marine Natural Resources (SMMNR)

Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)

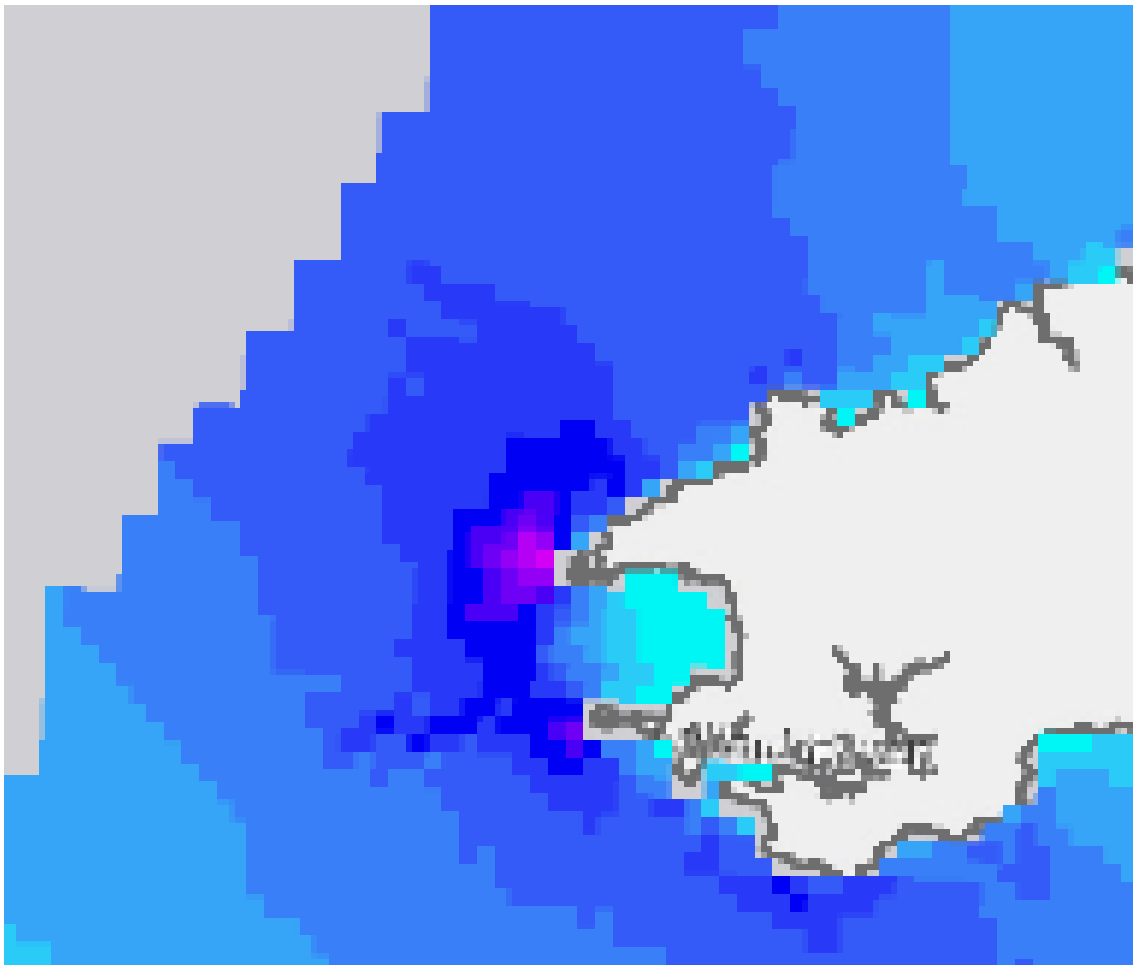


Figure X. Spatial constraints for tidal stream

Spatial Constraints and Mapping – Datasets

Key datasets:

- Data collation exercise
- Key datasets used for mapping – not exhaustive:
  - Designated sites
  - Section 7 features
  - Annex 1 habitats (reefs)
  - Fish nursery/spawning
  - Bird density maps (OBIS)
- Link to datasets (lle portal or otherwise)
- Limitations of data sets

Sustainable Management of Marine Natural Resources (SMMNR)		
Sector: Tidal Stream	Location: Pembrokeshire	Evidence Package (No. X)

Spatial Constraints and Mapping – Conclusions

(related to relevant geographical/identified resource area)

- Summary comments re site selection:
  - General constraints:
    - List overlapping designations
    - Key sensitive features
  - Recommendations re site selection (based on existing evidence)
  - Limitations of constraints analysis
  - Linkages to wider assessment processes for plan development (SEA, HRA etc)
  - Relative consenting risks across the selected resource area
  - Consideration of wider area
  - Comparative consenting risks to other related resource areas
  - Wider constraints inc. other development
  - Links to previous relevant applications e.g. tidal stream developments around Ramsey Island

Wider Links

- TCE marine data exchange http://www.marinedataexchange.co.uk/
- TCE website
- Seascape and visual sensitivity to offshore wind farms
- ORJIP (http://www.orjip.org.uk);
- ORJIP Ocean Energy. EIA Tools [online]. Available at: http://www.orjip.org.uk/eia-tools
- IMPACT http://www.marine-impact.co.uk/index.asp
- Data from demonstration zones (http://www.marineenergywales.co.uk/marine-energy-in-wales/demonstration-zones ; http://www.morlaisenergy.com ; https://www.wavehub.co.uk/pembrokeshire-wave-zone)
- MEECE (http://www.marineenergywales.co.uk/marine-energy-in-wales/projects/pembroke-dock-marine)

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