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ORJIP Ocean Energy

Information Note: Changes in Benthic and Pelagic Habitats caused by Marine Renewable Energy Devices

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MarineSpace Making Sense of the Marine Environment™

CONTENTS

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1 INTRODUCTION

This series of technical, topic specific Information Notes has been co-produced by the Welsh Consenting Strategic Advisory Group's Science and Evidence subgroup (SEAGP) in order to support the consenting of wave and tidal stream energy projects. The Information Notes have been developed to establish the current position of key stakeholders in Wales on the evidence available on interactions of wave and tidal energy technologies with the marine environment. They are designed to set out a starting point for applicants by providing an understanding of where consenting challenges might lie. The aim of the Information Notes is to support marine licence applications that are robust, proportionate, and focused on assessing the key potential significant impacts and possible interactions between marine renewable energy (MRE) devices and the marine environment.

These Information Notes will support careful consideration of how, for a particular development, potential impacts that are considered low risk could be safely retired from further detailed consideration within Environmental Impact Assessments (EIA), where available evidence supports this approach. Ocean Energy Systems-Environmental (OES-Environmental) has set out a general process for risk retirement[1,2] but for developments in Welsh waters, risk retirement should always be discussed between developers and Natural Resources Wales (NRW) at the pre-application stage. In the context of these Information Notes, risk retirement implies that all potential impacts are included for consideration at the project scoping stage, and that following a review of the evidence some impacts may be 'scoped out' of any further detailed assessment to focus EIA on key significant impacts[3]. In all cases, potential impacts should be acknowledged in EIAs, with evidence-based justifications describing why particular impacts could be 'scoped out' of further detailed assessment.

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[1] https://tethys.pnnl.gov/events/oes-environmental-webinar-risk-retirement

[2] https://tethys.pnnl.gov/publications/state-of-the-science-2020-chapter-13-risk-retirement

[3] It should be noted that The Wildlife Trusts expressed concerns about the use of the phrase 'risk retirement' being applied in this context, particularly considering the uncertainties in impact assessment that are likely to arise with increasing scale of MRE developments.

Further information about this series of Information Notes, who these documents are for, how they were produced, and how they should be used can be found in the accompanying document *Information Notes: Background Information.* The *Information Notes: Background Information* documentation also contains information about the terminology used in this document.

1.1 BENTHIC AND PELAGIC HABITATS - GENERAL

Assessments of benthic and pelagic habitats fall under the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended), which requires an assessment to be carried out of the potential significant impacts that could occur, directly or indirectly, from a proposed development (including both devices and cables). The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 also apply and require an assessment of a proposed project prior to consent to ensure there are no adverse effects on marine protected areas (MPAs). MPAs are in place to protect certain habitats and species listed in the regulations. In Wales, the Environment (Wales) Act 2016 also requires certain habitats and species of conservation importance to be protected or enhanced.

Applicants applying for a marine licence may therefore be required to undertake benthic marine habitat surveys and monitoring to support an application. NRW guidance is available on methods and approaches for survey and monitoring of benthic habitats[4] (NRW 2019).

Pelagic habitats encompass the water column into which MRE devices will be placed. They create a home to microbes, plankton, and other life that forms the basis of the marine food chain (UKMMAS 2022). Changes to pelagic habitats from MRE development can have secondary effects on other receptor groups occupying that space such as forage fish and marine mammals.

Monitoring benthic and pelagic habitat change at several MRE developments has provided some information about potential effects from single device and small array deployments. The purpose of these monitoring programmes has generally been to detect changes to the local environment after deployment of an MRE device. Monitoring programmes are often designed to detect whether there is a change before and after installation, rather than to detect why a change is happening and this has made it difficult to understand the cause-effect relationships that result in such changes (Dannheim et al. 2018). It is, however, possible to gather experience and understanding from similar industries such as oil and gas and offshore wind farms. Studies of habitat change at offshore wind farms, for example, suggest that new infrastructure can cause changes in habitat that influence local biodiversity and ecosystem resilience over time

[4] https://naturalresources.wales/guidance-and-advice/business-sectors/marine/benthic-habitat-assessments-for-marine-developments/?lang=en

(Causon and Gill 2018). However, these effects will be highly dependent on the type of MRE development, as the characteristics of habitats are dependent on physical characteristics such as depth, flow speeds, wave exposure, and seabed substrate type. The natural variability in benthic and pelagic habitats in high-energy environments has only been described by a few studies and is not well characterised (Kregting et al. 2016).

1.2 EVIDENCE SOURCES CONSIDERED BY SEAGP

SEAGP members were asked to apply their expertise and were encouraged to read the OES-Environmental Short Science Summary document[5] on changes in benthic and pelagic habitats in advance of providing a response to a questionnaire on this topic. Respondents were also encouraged to consult the full chapter on benthic and pelagic habitats within the OES-Environmental 2020 State of the Science Report[6]. Additional key references are listed at the end of this document.

2 VIEWS OF NATURAL RESOURCES WALES ON CHANGES TO BENTHIC AND PELAGIC HABITATS

The information presented in this section was gathered in consultation with Natural Resources Wales (NRW) specialists including those for fish, ornithology, and benthic receptor groups.

2.1 GENERAL PERSPECTIVES ON BENTHIC AND PELAGIC HABITAT CHANGE

A general perspective of environmental risk associated with changes to benthic and pelagic habitats is set out in Table 1, but NRW highlights that this should be considered alongside the location-specific characteristics associated with the MRE development in question. The addition of any type of infrastructure on to the seabed has the potential to result in direct changes in benthic habitats through habitat loss and indirect impacts such as scour, changes in physical process, and the introduction of invasive non-native species (INNS). NRW considers that even a single device could cause significant impact to habitats sensitive to change.

NRW considers the current evidence base to be adequate to support decision-making at single-device scale, although site-specific data would always be required to support an assessment. There are greater gaps in the evidence base for small and large arrays.

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[5] https://tethys.pnnl.gov/sites/default/files/summaries/Changes-Benthic-Pelagic-Habitats-SSS_1.pdf

[6] https://tethys.pnnl.gov/publications/state-of-the-science-2020-chapter-6-habitat-changes

For large array-scale developments, this impact is considered to be of very high priority and would be very likely to be 'scoped in' to an EIA. The potential to introduce INNS should, as a rule, be 'scoped in' to all assessments and managed through a biosecurity risk assessment and management plan.

Table 1. NRW perspectives on the general level of environmental risk* associated with habitat change for generic development scenarios.

Deployment scale	Very low	Low	Intermediate	High	Very high
Single device			✓		
Small array				✓	
Large array					✓

**Note that risks are, by their nature very site specific. This table should be treated as a general indication of risk.*

2.2 SEABED HABITATS AND INVERTEBRATES

The level of risk associated with this effect for benthic receptor groups and seabed habitats was substantial, and relatively greater than for other receptor groups (Table 2).

Table 2. NRW perspective on the importance of habitat change as an effect on seabed habitats and invertebrates and on the status of the current evidence base

Deployment scale	Importance*	Available evidence base**
Single device	Intermediate	Adequate‡
Small array	High†	Poor
Large array	Very high†	Poor

**the scale for relative importance is 'negligible, very low, low, intermediate, high, very high'*
***the scale for evidence base is 'very poor, poor, adequate, good, very good'*
†The relative importance is highly dependent on factors such as effects on protected habitat, array size, and magnitude of changes to physical processes.
‡This is a general assessment of the evidence base and that specific assessments will depend on evidence available at each development location

The importance of this effect on seabed habitats and benthic receptor groups will increase with the scale of a MRE development, as greater levels of change to benthic habitats and larger zones of impact would be expected for larger developments. A small array is also more likely than a single device to cause indirect habitat alteration and/or loss from changes in physical processes such

as scour. Similarly, a large array is more likely to cause these effects than a small array. Assessing the level and significance of likely impact and changes therefore becomes more difficult when array size increases.

2.2.1 Factors influencing effects on seabed habitats and invertebrates

Different MRE devices may have different anchoring and seabed attachment methods and different seabed footprints. Each device type will likely cause different levels of pressure on the environment, for example:

- direct impact from habitat loss;
- habitat change due to scour;
- changes to sediment processes;
- abrasion from mooring chains; and
- potential impacts from INNS using seabed infrastructure as "stepping stones".

NRW considers it difficult to comment on specific device types without understanding how specific devices affected seabed physical processes. Furthermore, NRW highlight that the introduction of INNS leading to habitat alteration would depend on the different activities associated with construction, maintenance, operation and decommissioning of a particular type of device such as vessel traffic.

The level of importance NRW would assign to this effect for benthic receptor groups will be highly dependent on the location of a development, and more specifically whether the habitat change, alteration, or potential habitat loss is located in a marine protected area (MPA). Adverse effects on MPAs could arise, depending on the type and amount of feature altered or lost.

Consideration should also be given to benthic habitats that fall outside of MPAs, but that are listed under Section 7 of the Environment (Wales) Act 2016.

2.2.2 Status of the evidence base and requirements for data collection

The level of evidence supporting decision-making around habitat change is considered to be adequate for single devices, but insufficient for small and large arrays, as uncertainty persists as developments increase in size.

Impacts to benthic receptor groups from both direct and indirect pressures would be assessed on a pressure / sensitivity basis. NRW would expect any new developments to undertake a baseline characterisation survey of seabed habitats to inform an EIA. It should be noted that there may be a select few exceptions to this requirement where seabed surveys have been recently undertaken.

It is recommended that applicants follow the NRW Benthic Habitat Assessment Guide[7] for surveys associated with EIA. This guidance includes methods that NRW would expect an applicant to use to characterise the benthic environment for inclusion in an EIA report. It is also recommended to view the Joint Nature Conservation Committee (JNCC) Monitoring Guidance for Marine Benthic Habitats (Noble-James et al. 2018).

2.2.3 Mitigation strategies

There are some mitigation strategies that could be used to reduce the risk of changes to benthic and pelagic habitats for MRE developments. These include:

- Micro-siting of export cables and infrastructure to minimise and or/avoid the impact on habitats and species,
- Micro-siting of offshore infrastructure to avoid sensitive habitats,
- Minimise the footprint of anchors/foundations and cable protection,
- Cable protection management measures to ensure that any rock placement that is required will be kept to a minimum,
- Avoid the introduction of hard bottom substrate into a soft bottom habitat.
- Monitoring and reporting of INNS,
- Compliance with all relevant guidance (including IMO guidelines) regarding ballast water management and transfer of non-native species.

2.3 FISH

The level of importance of habitat change as an effect on fish receptor groups is illustrated in Table 3.

Table 3. NRW perspective on the importance of habitat change as an effect on fish and on the status of the current evidence base

Deployment scale	Importance*	Available evidence base**
Single device	Negligible	Adequate
Small array	Very low	Adequate
Large array	Low	Poor

**the scale for relative importance is 'negligible, very low, low, intermediate, high, very high'*
***the scale for evidence base is 'very poor, poor, adequate, good, very good'*

For single devices, this effect is considered to be of negligible importance. As developments scale up, the effect could increase in importance, particularly for

[7] https://naturalresources.wales/guidance-and-advice/business-sectors/marine/benthic-habitat-assessments-for-marine-developments/?lang=en

demersal species, depending on the location of the array and type of habitat change. The type of device will also influence the importance of this effect on fish and consequently the level of assessment, as different devices will have different seabed footprints.

2.3.1 Status of the evidence base and requirements for data collection

The evidence base detailing the effects of habitat change pertaining to fish is generally adequate for most developments apart from large arrays. NRW considers that for a large array there could be a larger scale of habitat loss, and that the effect on fish species that use the habitat is less certain.

NRW advise that at a minimum, applicants would need to provide information about the type(s) of habitat affected, and the footprint of habitat loss, although effects of habitat change on fish would potentially take less precedence than effects on benthic receptor groups. It is unlikely that the effects of habitat change on fish would be further 'scoped in' to an assessment of a single device deployment, although this likelihood would increase as development size increases.

2.3.2 Mitigation strategies

Mitigation strategies that could be considered by applicants include:

- micro-siting of devices,
- consideration of different types of scour protection (e.g. bioblocks or use of locally sourced material similar to the habitat type), and,
- minimising the footprint of the device.

2.3.3 Priority for research and monitoring

Relative to other environmental effects on fish from MRE devices, habitat change should be given a moderate level of priority for research. A key area for future research will be understanding how reliant fish species are on habitats that could be lost through MRE development.

2.4 SEABIRDS

Table 4 describes the importance of habitat change relative to other effects from MRE devices on seabirds. Although the relative importance is low for single devices, the importance could increase with increasing development size.

Table 4. NRW perspective on the importance of habitat change as an effect on seabirds and on the status of the current evidence base

Deployment scale	Importance*	Available evidence base**
Single device	Very low	Adequate
Small array	Low	Poor
Large array	Low	Poor

**the scale for relative importance is 'negligible, very low, low, intermediate, high, very high'*
***the scale for evidence base is 'very poor, poor, adequate, good, very good'*

2.4.1 Factors influencing effects on seabirds

As with other receptor groups, NRW suggest that this will be highly dependent on the location of an array, specifically whether it is in or near an MPA where seabirds forage. It will also depend on the type of device and the nature of impact to benthic communities on which seabirds feed. Species of interest include benthic feeding seabirds such as scoter, divers and eider.

2.4.2 Status of the evidence base and requirements for data collection

The present level of information available about how changes to habitat from MRE devices affect seabirds is considered to be adequate for decision-making for single devices, but less so for small and large arrays. NRW would expect to see project-specific information included in an EIA such as the type of habitat affected and the footprint of habitat loss for developments of all scales, although for single devices it is unlikely that further assessment would be required for this receptor group. More detail would likely be required for small and large arrays.

2.4.3 Mitigation strategies

Mitigation strategies for effects on seabirds from habitat change were not identified.

2.4.4 Priority for research and monitoring

At present, NRW would give low priority to researching and monitoring the effects of habitat change from MRE development on seabirds, relative to other environmental effects.

3 PERSPECTIVES FROM ENVIRONMENTAL ORGANISATIONS

Information in this section has been provided by The Wildlife Trust (TWT) and brief commentary from the Royal Society for the Protection of Birds (RSPB).

TWT's most substantial concern around changes to habitats is associated with the scaling up of developments, including both additional devices and cable infrastructure. It will be important for project developers to consider not only the footprint of chosen devices on the seabed, but also the specific characteristics of the seabed habitats, and whether the habitats are considered to be irreplaceable.

3.1.1 Considerations for developers

TWT has extensive experience in engaging with developers, advisors and government on reducing impacts of infrastructure on benthic habitats, particularly from cables. Key considerations suggested for project developers include:

- The combined impacts of devices and cabling, in terms of habitats disturbance, damage and loss during construction, operation and decommissioning,
- The potential for infrastructure to be decommissioned. If it cannot be decommissioned, then impacts must be considered to be permanent,
- Implementing cable protection methods that minimise seabed impacts, for example by leaving cables exposed in fisheries and anchoring exclusion zones,
- Coordination of cabling infrastructure between developers to reduce impacts. Engagement with UK Department for Business, Energy, and Industrial Strategy's Offshore Transmission Network Review (OTNR) is important for all projects,
- Effects of habitat disturbance, damage or loss on other parts of the ecosystem, for example through provision of prey for mobile species.

As developments scale up further alongside other marine infrastructure, impacts of habitat change on the wider ecosystem could also become significant.

TWT considers that good planning that enables avoidance or reduction of impacts in advance of the development being commissioned is important. Developers are encouraged to think about how a project could be designed to minimise impacts, for example through siting and choice of cable protection, or by using innovative techniques to avoid damage.

3.1.2 Wider considerations for changes to benthic and pelagic habitats

TWT noted that support for MRE developments is rooted in mitigating climate change, however efforts to restore habitats, reach good environmental status of UK waters, support climate adaptation, and ensure 'no net loss' should be given equal footing. Strategic management of future development in the marine environment is difficult, particularly in a 'no net loss context', as it is challenging to find adequate strategies for compensation and mitigation of

effects on benthic habitats, especially for developments in and near MPAs. For marine habitat change, TWT considers it important to remove existing pressures to enable recovery and maintain a coherent network of protected areas.

The maintenance of blue carbon stores is also an important issue for TWT in the context of benthic habitat change, as construction, operation, and decommissioning activities could cause disturbance that releases natural carbon. Natural capital, or the parts of ecosystems that directly or indirectly provide value to people (NCC 2019), should be a consideration throughout the development process from consenting to decommissioning, as it is strongly associated with the maintenance of healthy ecosystems.

3.1.3 Additional perspectives

RSPB commented that changes to benthic and pelagic habitats was not an issue that they would look at as part of an assessment, as much of their focus is on potential collisions between seabirds and MRE devices. However, they are interested in any potential secondary effects that developments would have on seabird prey distribution and prey availability. These secondary effects are typically built into collision risk modelling as part of the overall avoidance rate included in the model.

4 PERSPECTIVES FROM INDUSTRY

The importance of this effect was considered to be very low or negligible for all receptor groups for single device deployments and small arrays. For large arrays, the level of importance of this effect would increase, and good site characterisation would be expected. The importance of this effect would also vary with deployment location, particularly where the development overlaps with protected features (MPAs or Environment (Wales) Act Section 7 habitats). Different types of devices could also affect the level of habitat change because of differing geometries and seabed footprints and degrees of interaction with the seabed and water column.

Relative to other environmental effects, industry members consider this effect to be very low risk for single devices and low to intermediate risk for small and large arrays. Industry consider that this effect should be 'scoped in' to EIA only at large array scale, and that it should not be 'scoped in' for further assessment at single device and small array scales. In all cases the availability of pre-existing information would be an important consideration.

4.1 STATUS OF THE EVIDENCE BASE AND REQUIREMENTS FOR DATA COLLECTION

For industry members, the current evidence base is considered sufficient for decision-making for single device and small array deployments, although less information was considered to be available for fish and benthic receptor groups. No further best practice was suggested for collecting project-specific

information beyond what has already been mentioned in this document, although it was highlighted that data from British Geological Survey and fishers are sources of information that are often missed.

No large arrays have yet been deployed, therefore empirical evidence at this scale is not yet available. In these circumstances, industry members suggest that an adaptive management approach would be sensible, where a large array is built in stages and monitored to inform each stage of development. It is stressed, however, that large projects may be commercially unviable unless enough devices are installed to make projects financially viable. Additional project risk is also associated with staged development scenarios as the regulator could restrict or refuse further development at an interim stage of the project.

Industry members suggest that there may be learning that could be applied from existing developments or other types of infrastructure such as offshore wind energy, which may have larger datasets relevant to habitat change that extend across greater spatial and temporal extents. Such data will not have been collected in the high-energy environments required for wave and tidal energy development, but some elements of learning could still be applied to inform decision-making.

4.2 MITIGATION MEASURES

Careful micro-siting or avoidance measures could help to mitigate impact, particularly when undertaken in the early stages of a project. If it is not possible to avoid areas of concern, then rigorous site-specific data collection should be used to understand the proposed receiving seabed environment and identify specific mechanisms for minimising and mitigating impacts. Minimising device seabed footprints (within engineering requirements) and the use of locally sourced materials for scour protection (particularly for arrays) were also suggested as potential mitigation measures. Management measures with the best impact for habitats should be implemented, while those that offer the least return in terms of mitigation or benefits to habitat may not be worthwhile for implementation.

Industry members noted that the loss of seabed habitat could generally be mitigated sufficiently to avoid any future issues, if it was considered from the outset of the development. Any consent conditions associated with monitoring or mitigating habitat change should be proportional and made within the context of the development site and the impacts of other industries operating in the area or same environment, for example dredging, trawler fishing and vessel anchoring. If the impacts of an MRE development on habitats are negligible in the context of the wider environment, then stringent monitoring or mitigation requirements would likely represent a poor investment in comparison with requirements associated with other issues.

4.3 PRIORITY FOR RESEARCH AND MONITORING

At present, benthic and pelagic habitat change is considered by industry members to be a low priority for research and monitoring. However, there are opportunities for improved understanding of habitat creation associated with introduced hard substrate. Such research could inform future management measures that address habitat change.

5 SUMMARY AND RECOMMENDATIONS

Changes to benthic and pelagic habitats are, apart from for benthic receptor groups, considered to be of low environmental risk for single device deployments. It is agreed that environmental risk associated with this effect would increase as the scale of development increased.

Developers are advised to follow current guidelines from NRW on assessment of benthic habitats, and to consider effects associated with both devices and cabling. Several mitigation strategies have been identified, and these should be adapted to the nature of development proposed, giving consideration to the type of seabed environment at the development site and the type of device proposed.

Although most SEAGP members noted that this issue is of lower priority for research and monitoring, a key evidence gap exists around the cause-effect relationships that result in habitat change and associated impacts on species. Sound, measurable, and quantitative studies of this effect will become increasingly important as deployments increase in scale, as there are larger evidence gaps for small and large arrays. Avoiding data-rich, information poor data is paramount to achieve a good understanding of the potential for habitat change associated with MRE developments (Wilding et al.2017). In the absence of monitoring data from large arrays, there may be opportunities to apply experience and understanding from other industries operating in the marine environment such as oil and gas and offshore wind farms.

The potential for MRE deployments to contribute to habitat creation in high-energy environments is also less well understood. It is noted that at present, measures for compensation of habitat loss may not be wholly effective, and so a more nuanced understanding of secondary effects from habitat change on other (e.g. mobile) species will become increasingly important for decision-making.

5.1 RECOMMENDATIONS

- Proportionate management and mitigation measures should be implemented to address impacts to benthic and pelagic habitats from MRE developments. Strategies that offer the greatest benefit in terms of management and mitigation should be selected over those that offer the least return.

- Learning from other marine industries such as offshore wind should be applied to the MRE sector, where appropriate, while acknowledging the unique physical characteristics of the high-energy environments where MRE developments will be installed.
- Collaboratively led monitoring programmes (as opposed to solely developer-led) at the first larger developments would provide essential data to inform future EIA and knowledge to address the current shortage of evidence to support decision-making at small and large array scales.
- Potential habitat creation and secondary effects on other species from the installation of MRE devices in high-energy environments should be investigated.
- The above recommendations could be incorporated into a collaborative, strategic environmental programme for MRE development in Wales and across the UK.

6 REFERENCES

NOTE THAT ADDITIONAL REFERENCES ARE INCLUDED THAT ARE NOT CITED IN THIS INFORMATION NOTE

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APPENDIX A ADDRESSING CHANGES TO BENTHIC AND PELAGIC HABITATS IN PREVIOUS MARINE ENERGY PROJECTS: LICENSING DOCUMENTS AND CONSENT CONDITIONS

Project Name	Location	Technology	Consenting Status	How habitat change is addressed	EIA / HRA / Other	Condition
MeyGen	Scotland	Tidal Stream Array	Constructed	Information regarding cable protection, scour protection and antifouling of devices is provided within a Construction Method Statement, together with areas of kelp and its removal and management practices to avoid the introduction of non-native marine species. Effects on benthic habitats assessed through: Aquatic Survey and Monitoring Limited (ASML); and macrobenthic analysis Particle Size Analysis (PSA) and Loss on Ignition analysis.	EIA S36 Consent condition (Condition 12)	Condition 12 of S36 Consent Chapter 10: Environmental Assessment

Project Name	Location	Technology	Consenting Status	How habitat change is addressed	EIA / HRA / Other	Condition
Morlais	Wales	Tidal Stream Demo Zone	Consented	Surveying and micrositing of the export cable route to avoid adverse effects on sensitive habitat and biogenic reefs. Burying cables at a sufficient depth, considering other constraints, to allow the seabed to recover to its natural state and the use of anti-fouling minimised on subtidal surfaces, to encourage species colonisation on structures	EIA	
Hywind Scotland	Scotland	Floating Offshore Wind	Consented	All vessels adhered to all relevant guidance including IMO guidelines for ballast water and transfer of non-native marine species. Specific criteria relating to fish ecology have been developed for 'sensitivity of receptor' and 'magnitude of effect' during impact assessment. Desk-based assessment benthic and intertidal	EIA	

Project Name	Location	Technology	Consenting Status	How habitat change is addressed	EIA / HRA / Other	Condition
				using project specific survey data.		
META	Wales	Wave and Tidal Demo Zone	Consented	Adopted post-consent/pre-deployment surveys to facilitate micrositing of infrastructure, Invasive Species Management Plan and Environmental Management Plan (EMP) Adopted Marine Pollution Contingency Plan for accidental pollution impacts on pelagic habitats	EIA EMP	
Moray Offshore Renewables (Moray West)	Scotland	Offshore Wind	Consented	A piling strategy, and a Marine Mammal Mitigation Plan (MMMP) will be produced for approval by the Scottish Ministers prior to construction and will subsequently be followed during the construction phase. An EMP was produced and followed to cover construction, operation and	HRA	

Project Name	Location	Technology	Consenting Status	How habitat change is addressed	EIA / HRA / Other	Condition
				maintenance phases of the development, including planning for accidental spills, and all potential contaminant releases		
EMEC	Scotland	Wave and Tidal Demo Zone	Consented	Adopted good-practise non-native and bio-fouling management. Adhered to the SMWWC guidelines during vessel use.	Billia Croo & Fall of Warness Environmental Appraisal documents	
West Islay Tidal Energy Park	Scotland	Tidal Stream Array	Consented	Post construction monitoring of benthic habitats. An appropriate EMP was produced and followed to cover the construction, operation and maintenance phase of the Development. This included planning for accidental spills, address all potential contaminant releases. Passive acoustic monitoring (PAM) for marine mammals	EIA	Decision letter and consent conditions A condition requiring post construction monitoring including benthic surveys. Conditions requiring an EMP are included in any consent granted by Scottish Ministers under section 36 of The Electricity Act (1989) and/ or any marine licence granted. (Section 36 Condition 17)

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