

Key issue 16 - Direct loss of protected or sensitive sub-littoral seabed communities due to the presence of wave and tidal energy converters and associated moorings / support structures on the seabed

What are the relevant technologies and support structures?

The following technologies and support structures were identified during the assessment process as having the potential to significantly affect seabed communities through loss of habitat or direct abrasion and should therefore, be subject to further investigation on a project specific basis.

Relevant technologies and support structures	Relevant features, components or activities	Phase
Wave technologies		
Overtopping device (shoreline) Oscillating wave surge converter Submerged pressure differential Oscillating water column (shoreline)	Loss of habitat <i>Loss of habitat due to new structures placed directly on the seabed</i>	Installation & Operation
Support structures		
Gravity / deadweight anchor and mooring lines Gravity base structure Rock anchors and mooring lines Drag embedment anchor and mooring lines	Direct abrasion <i>Potential abrasion caused by mooring lines dragging or rubbing across the seabed or from gravity bases during installation.</i>	Installation & Operation
Gravity / deadweight anchor and mooring lines Gravity base structure Monopile Rock anchors and mooring lines Drag embedment anchor and mooring lines	Loss of habitat <i>Loss of habitat due to new structures placed directly on the seabed</i>	Installation & Operation

What species / groups may be vulnerable?

The following habitats and species were identified during the assessment as being particularly sensitive to habitat loss and abrasion and should therefore, be considered further on a project specific basis.

Relevant species / groups	Possible consequences
Species or habitats of conservation interest (e.g. Habitats directive, BAP habitat, OSPAR, CITES) or limited distribution found within the following Eunis habitats (see assessment for details):	
A3.1 : Atlantic and Mediterranean high energy infralittoral rock A3.2 : Atlantic and Mediterranean moderate energy infralittoral rock A4.1 : Atlantic and Mediterranean high energy circalittoral rock A4.2 : Atlantic and Mediterranean moderate energy circalittoral rock A5.1 : Sublittoral coarse sediment A5.2 : Sublittoral sand A5.4 : Sublittoral mixed sediments	Direct Abrasion Potential abrasion caused by mooring lines dragging or rubbing across the seabed or from anchors / gravity bases during installation. <i>Abrasion is likely to damage or kill species, which are sessile or sedentary.</i>

<p>A5.5 : Sublittoral macrophyte-dominated sediment A5.6 : Sublittoral biogenic reefs</p>	
<p>As above plus A4.7 : Features of circalittoral rock</p>	<p>Loss of habitat Loss of habitat due to new structures placed directly on the seabed</p> <p><i>All these species are sessile or sedentary and will be affected by loss of habitat.</i></p> <p><i>Even small amounts of lost habitat may diminish populations of species that recorded as rare.</i></p>

What species / groups are affected by which technologies and support structures

The following table provides a summary of the assessment results for each species or habitats in combination with each technology & Moorings/Support structures listed above.

Potentially significant at a 10MW scale	Unknown whether this will be significant at a 10 MW scale	Not Applicable	Assessed as not significant at a 10MW scale
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Direct Abrasion	Technology & Moorings and Support structures																				
Habitat	Horizontal axis turbine & Gravity/deadweight anchor and mooring lines	Horizontal axis turbine & Gravity base structure	Horizontal axis turbine & Rock anchors and mooring lines	Vertical axis turbine & Gravity/deadweight anchor and mooring lines	Vertical axis turbine & Gravity base structure	Vertical axis turbine & Rock anchors and mooring lines	Reciprocating hydrofoils & Gravity base structure	Oscillating water column (offshore) & Gravity/deadweight anchor and mooring lines	Oscillating water column (offshore) & Rock anchors and mooring lines	Oscillating water column (offshore) & Drag embedment anchor and mooring lines	Overtopping device (offshore) & Gravity/deadweight anchor and mooring lines	Overtopping device (offshore) & Rock anchors and mooring lines	Overtopping device (offshore) & Drag embedment anchor and mooring lines	Attenuator & Gravity/deadweight anchor and mooring lines	Attenuator & Rock anchors and mooring lines	Attenuator & Drag embedment anchor and mooring lines	Oscillating wave surge converter & Gravity base structure	Point absorber & Gravity/deadweight anchor and mooring lines	Point absorber & Rock anchors and mooring lines	Point absorber & Drag embedment anchor and mooring lines	Submerged pressure differential & Gravity base structure
A3.1 : Atlantic and Mediterranean high energy infralittoral rock Including BAP Habitat "Tidal swept channels"																					
A3.2 : Atlantic and Mediterranean moderate energy infralittoral rock Including BAP Habitat "Tidal swept channels", "Sabellaria spinulosa reefs"																					
A4.1 : Atlantic and Mediterranean high energy circalittoral rock Including BAP Habitat "Tidal swept channels"																					
A4.2 : Atlantic and Mediterranean moderate energy circalittoral rock																					
A5.1 : Sublittoral coarse sediment Including BAP habitats "Subtidal sands and gravel", "Horse mussel beds"																					
A5.2 : Sublittoral sand																					

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Habitat	Horizontal axis turbine & Gravity/deadweight anchor and mooring lines	Horizontal axis turbine & Gravity base structure	Horizontal axis turbine & Rock anchors and mooring lines	Vertical axis turbine & Gravity/deadweight anchor and mooring lines	Vertical axis turbine & Gravity base structure	Vertical axis turbine & Rock anchors and mooring lines	Reciprocating hydrofoils & Gravity base structure	Oscillating water column (offshore) & Gravity/deadweight anchor and mooring lines	Oscillating water column (offshore) & Rock anchors and mooring lines	Oscillating water column (offshore) & Drag embedment anchor and mooring lines	Overtopping device (offshore) & Gravity/deadweight anchor and mooring lines	Overtopping device (offshore) & Rock anchors and mooring lines	Overtopping device (offshore) & Drag embedment anchor and mooring lines	Attenuator & Gravity/deadweight anchor and mooring lines	Attenuator & Rock anchors and mooring lines	Attenuator & Drag embedment anchor and mooring lines	Oscillating wave surge converter & Gravity base structure	Point absorber & Gravity/deadweight anchor and mooring lines	Point absorber & Rock anchors and mooring lines	Point absorber & Drag embedment anchor and mooring lines	Submerged pressure differential & Gravity base structure	
Including BAP habitat "Subtidal sands and gravel", "Blue mussel beds"																						
A5.4 : Sublittoral mixed sediments Including BAP Habitat "Horse mussel beds", "File Shell Beds"																						
A5.5 : Sublittoral macrophyte-dominated sediment Including BAP habitats "Maerl beds", "Tidal swept channels", "Horse mussel beds", "Blue mussel beds"																						
A5.6 : Sublittoral biogenic reefs Including BAP Habitats "Horse mussel beds", "Cold-water coral reefs", "Blue mussel beds"																						

Loss of habitat	Technology & Moorings and Support structures																										
Habitat	Horizontal axis turbine & Gravity/deadweight anchor and mooring lines	Horizontal axis turbine & Gravity base structure	Horizontal axis turbine & Monopile	Horizontal axis turbine & Rock anchors and mooring lines	Vertical axis turbine & Gravity/deadweight anchor and mooring lines	Vertical axis turbine & Gravity base structure	Vertical axis turbine & Rock anchors and mooring lines	Reciprocating hydrofoils & Gravity base structure	Reciprocating hydrofoils & Monopile	Oscillating water column (offshore) & Gravity/deadweight anchor and mooring lines	Oscillating water column (offshore) & Rock anchors and mooring lines	Oscillating water column (offshore) & Drag embedment anchor and mooring lines	Oscillating water column (shoreline)	Overtopping device (offshore) & Gravity/deadweight anchor and mooring lines	Overtopping device (offshore) & Rock anchors and mooring lines	Overtopping device (offshore) & Drag embedment anchor and mooring lines	Overtopping device (shoreline)	Attenuator & Gravity/deadweight anchor and mooring lines	Attenuator & Rock anchors and mooring lines	Attenuator & Drag embedment anchor and mooring lines	Oscillating wave surge converter & Gravity base structure	Point absorber & Gravity/deadweight anchor and mooring lines	Point absorber & Rock anchors and mooring lines	Point absorber & Drag embedment anchor and mooring lines	Submerged pressure differential & Gravity base structure		
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How could the issue be addressed on a project and site specific basis?

The following tables provide a series of suggested activities and recommendations that may be taken forward to address the effects of habitat loss and abrasion on seabed communities for those technologies and/or support structures, and species / habitats, assessed as significant in the assessment. This information is not prescriptive and should be used as a platform for discussion on a project and site specific basis in order to develop an appropriate impact assessment strategy and monitoring programme for the project.

Single test deployments

Preliminary desk based studies

Activity	Objective	Recommendation / comment
Review of existing information regarding seabed conditions and communities in the proposed development area	To inform baseline survey plans and predict the presence / absence of any habitats and species identified as particularly vulnerable	This should be undertaken in all instances although data and information is likely to be largely generic and sparse in most unsurveyed areas.
Undertake impact assessment	To identify any particular areas of concern regarding the proposed development and to determine what/if further baseline characterisation is required (see below).	This should follow the normal project specific EIA procedures.

Baseline characterisation surveys

Activity	Objective	Recommendation / comment
Pre-installation baseline survey using swathe bathymetry with photo / video ground truthing. If any sensitive species / habitats are found to be present, wider survey to establish distribution of that species in the wider area.	To determine the relative sensitivity of the proposed development area and to inform the impact assessment	This should be undertaken in all previously unsurveyed areas.

Further desk based studies

Activity	Objective	Recommendation / comment
Undertake impact assessment	To determine whether or not there are likely to be any potentially significant effects on the habitats and species identified	This should follow normal EIA procedures.

Monitoring during and post installation

Activity	Objective	Recommendation / comment
Post-installation survey	To gauge any impacts, validate assumptions made during the impact assessment process and to inform future impact assessment and consenting activities	This should be undertaken in all circumstances.
Post-decommissioning survey	To gauge any impacts, validate assumptions made during the impact assessment process and to inform future impact assessment and consenting activities	This should be undertaken in all circumstances.

Demonstration arrays

Preliminary desk based studies

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