Key issue 7 - Potential risk of entrapment of marine mammals and basking shark from wave and tidal energy converters and associated moorings or support structures

What are the relevant technologies and support structures?

The following technologies and support structures were identified during the assessment process to pose a risk of entrapment to marine mammals and basking shark 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		
Oscillating water column (offshore)	*Potential for entrapment within chambers or reservoirs*	Operation
Overtopping device (offshore) Oscillating water column (shoreline)		
Overtopping device (shoreline)		
Support structures		
Gravity / deadweight anchor and mooring lines Rock anchors and mooring lines Drag embedment anchor and mooring lines	*Potential for entrapment within complex mooring arrays*	Operation

What species / groups may be vulnerable?

The following species were identified during the assessment process as being at risk from entrapment and should therefore, be considered further on a project specific basis.

Relevant species / groups	Notes	Possible consequences
Seals Cetaceans	Oscillating water column (offshore) only	*It is unknown whether the potential exists for animals to become entrapped within the device. This will be dependent on the size and design of the chamber and the response of the animal.*
Seals	Overtopping device (offshore) & Oscillating water column (shoreline) only	
Seals Otter	Overtopping device (shoreline) only	
Seals Cetaceans Basking shark	Support structures only	*Potential for entrapment within complex mooring arrays is unknown.*

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

	Technology & Moorings and Support structures																	
Common name	Horizontal axis turbine & Gravity/deadweight anchor and mooring lines	Horizontal axis turbine & Rock anchors and mooring lines	Vertical axis turbine & Gravity/deadweight anchor and mooring lines	Vertical axis turbine & Rock anchors and mooring lines	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	Point absorber & Gravity/deadweight anchor and mooring lines	Point absorber & Rock anchors and mooring lines	Point absorber & Drag embedment anchor and mooring lines
Common seal																		
Grey Seal																		
Killer whale																		
Minke whale																		
Long finned pilot whale																		
Atlantic white-sided dolphin																		
White-beaked dolphin																		
Bottlenose dolphin																		
Short-beaked common dolphin																		
Risso's dolphin																		
Harbour Porpoise																		
Otter																		
Basking Shark																		

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 risk of entrapment for marine mammals and basking shark for those technologies and/or support structure, 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 deployment

Preliminary desk based studies

Activity	Objective	Recommendation / comment
Desk based review of existing information regarding species distribution / behaviour across the site	To establish the importance of the proposed development area for any potentially vulnerable species	This should be undertaken for all single deployments involving a chamber or reservoir.
Determine the potential for an entrapment event	To determine if entry into chamber / reservoir is possible by establishing size and design of chamber in relation to size of relevant species	
Undertake impact assessment	To determine whether or not there are likely to be any significant impacts on the species identified	

Baseline characterisation surveys

Activity	Objective	Recommendation / comment
No activity recommended	N/A	N/A

Further desk based studies

Activity	Objective	Recommendation / comment
No activity recommended	N/A	N/A

Monitoring during and post installation

Activity	Objective	Recommendation / comment
Record any incidents and report to the Regulator	To build-up a database of information regarding the potential entrapment of animals in chambers and reservoirs to inform future environmental assessment and site selection work	This should be undertaken for all single deployments involving a chamber or reservoir with the potential for entrapment. Routine inspections should be undertaken during operation (this could be undertaken during maintenance activities or through remote monitoring).

Demonstration arrays

Preliminary desk based studies

Activity	Objective	Recommendation / comment
Desk based review of existing information regarding species distribution / behaviour across the site	To establish the importance of the proposed development area for any potentially vulnerable species	This should be undertaken for all arrays involving a chamber or reservoir.
Determine the potential for an entrapment event	To determine if entry into chamber / reservoir is possible by establishing size and design of chamber in relation to size of relevant species	
Undertake impact assessment	To determine whether or not there are likely to be any significant impacts on the species identified	

Baseline characterisation surveys

Activity	Objective	Recommendation / comment
No activity recommended	N/A	N/A

Further desk based studies

Activity	Objective	Recommendation / comment
No activity recommended	N/A	N/A

Monitoring during and post installation

Activity	Objective	Recommendation / comment
Record any incidents and report to the Regulator	To build-up a database of information regarding the potential entrapment of animals in chambers and reservoirs to inform future environmental assessment and site selection work	This should be undertaken for all single deployments involving a chamber or reservoir with the potential for entrapment. Routine inspections should be undertaken during operation (this could be undertaken during maintenance activities or through remote monitoring).