

META Device-specific Navigational Risk Assessment: Micro tidal turbines deployment at Warrior Way

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Introduction

META has undertaken a [META Sitewide Navigational Risk Assessment](#) which covers the META Phase 2 (Open Water) test areas (Warrior Way; Dale Roads; and East Pickard Bay) and considers the full range of device types and activities consented in the META Phase 2 project design envelope.

In addition to this the META Phase 2 Marine Licence ORML1957v2 consent conditions require that:

“The Licence Holder must submit a device-specific Navigational Risk Assessment (NRA) for written approval at least 8 weeks prior to any deployment operation. This NRA must propose appropriate device-specific risk controls. No deployment may be undertaken prior to written agreement from the Licensing Authority.

The Licence Holder must ensure that any actions outlined in the Navigational Risk Assessment are implemented as approved in writing by the Licensing Authority. Any proposed changes to the actions outlined in the documents must be submitted to, and agreed in writing by the Licensing Authority prior to any changes being enacted.”

The purpose of this document is to identify navigational risk associated with the proposed micro tidal turbines deployment at the META Warrior Way site and outline appropriate measures that will be implemented to manage risk.

Device and project description

1. Overview

META would like to deploy 3 micro tidal turbines designed to provide 24/7 power to environmental monitoring equipment at the **META Warrior Way site for 6 months from 19th January 2027 to the 19th July 2027.**

Each turbine will be deployed on a bedframe on the seabed. Each turbine will have a diameter of 1m and a maximum tip speed of 4 m/s. Each bedframe will be 1.33m (W) x 1.65 (L) x 2.5m (H). The frame and turbine combined weight is 655kg and they will be recovered using an acoustic release system. A data buoy will be deployed nearby with the Warrior Way site boundary to remotely collect data from the turbines and mark the site.

The aim of the test is to prove micro tidal turbines can provide enough power to keep environmental monitoring equipment or other subsea systems operational 24/7. Please drawings / pictures below.

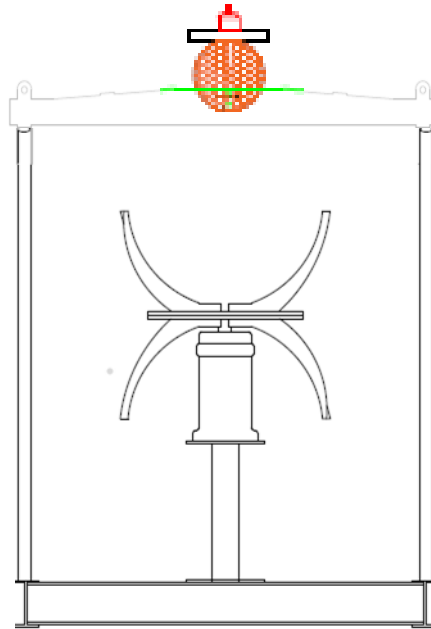


Figure 1 Micro tidal turbine designed to provide 24/7 power to environmental monitoring equipment. Turbine diameter is 1m. The frame is 1.33m (W) x 1.65m (L) x 2.5m (H). The frame and turbine combined weight is 655kg. On top of the frame is an acoustic release system for recovery.

2. Mooring arrangement

Each micro tidal turbine is securely attached to a steel bedframe, each with a combined weight of 655kg. The bottom of the bedframe is 1.33m x 1.65m and will sit flatly on the seabed and its own weight will secure it to the bottom. Each unit will have its own acoustic release recovery system on top of the bedframe as pictured in figure 1, which means there is no requirement for a top mark. Each bedframe will extend 2.5m above the seabed. The water depth at the proposed positions is 16 – 20m at LAT. Therefore, this deployment should not impact on vessel draft.

A data buoy will be moored on a single point mooring further upstream from the micro tidal turbines to mark the site plus receive live performance data from the turbines and send to shore via satellite.

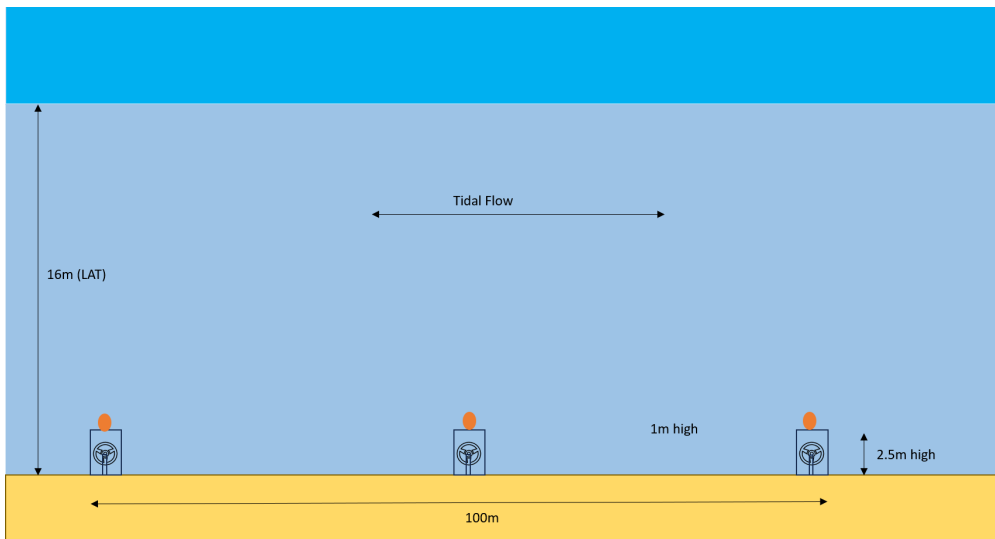


Figure 3 Three micro tidal turbine bedframes will be deployed on the seabed at the META Warrior Way test site in a line parallel to the tidal flow / channel in approximately 16 – 20m water depth LAT. Drawing not to scale.



Figure 2 A data buoy like this one pictured will be moored on a single point mooring nearby within the Warrior Way site to remotely collect data from the turbines and mark the site. It will be yellow, with a St Andrews Cross and Yellow Flash Characteristic (Fl Y 4s)

3. Key locations

The bedframes and data buoy will be located at the proposed positions below. The position of the data buoy is flexible, and the final position will be decided with Milford Haven Port Authority (MHPA) to ensure it is at a location within the Warrior Way site that doesn't pose a risk to users of the waterway, especially since the project duration extends into the recreational season.

Table 1 Device and mooring positions

	Latitude:	Longitude:
Micro Turbine 1	51° 42.2255'N	4° 55.6638'W
Micro Turbine 2	51° 42.2072'N	4° 55.6298'W
Micro Turbine 3	51° 42.1889'N	4° 55.5983'W
Data Buoy	51° 42.1111'N	4° 55.4275'W

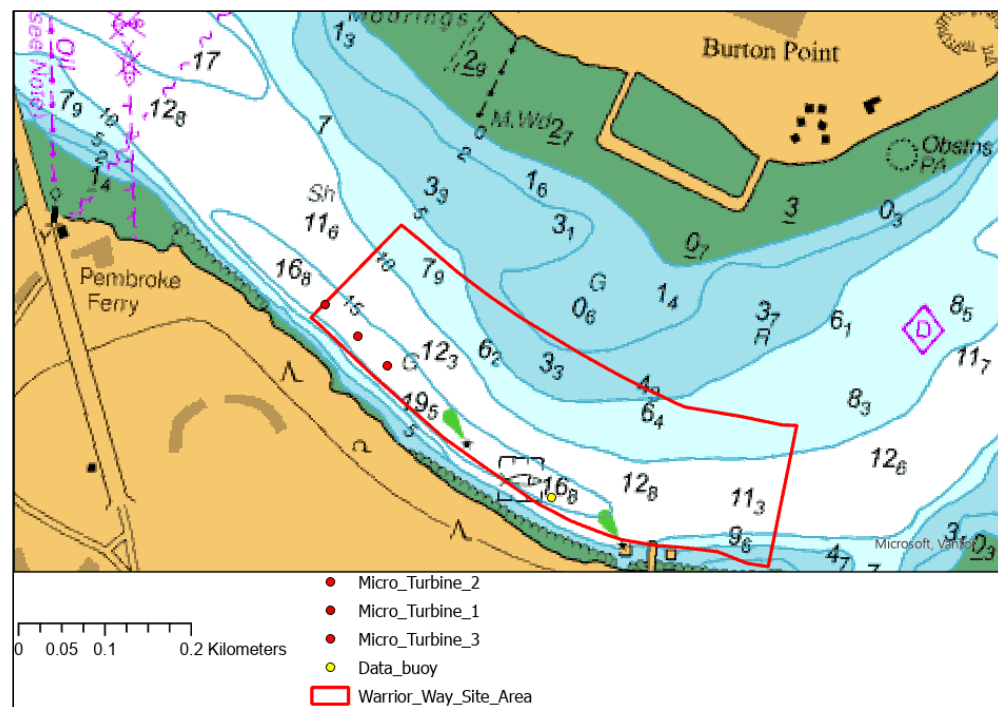


Figure 4 Chart showing the proposed location of the three micro tidal turbines and the data buoy within the META Warrior Way test site area.

4. Summary of activities

Summary of Installation, Maintenance and Decommissioning activities presented below (Table 2). Detailed RAMS, specific lift plans and specific tow plans will be drafted and provided to MHPA in a timely manner prior to commencement of work.

Table 2 Summary of Installation, Maintenance and Decommissioning activities

Task	Installation
1	Equipment loaded onto the Dale Sailing KITCAT at Brunel Quay, Neyland
2	Update VTS of vessel movement and planned operation. Then transit to Warrior Way test site (<1km).
3	Skipper positions vessel at deployment locations and confirms conditions are within limits and the area is clear of traffic.
4	Turbines each individually lowered under control to the seabed by crane on a slip line passed through its lifting point. Tag lines are used until the turbine is clear of the vessel.
5	Once the turbine has landed and the line is slack, one end of the slip line is released and the line hauled back on board.
6	Acoustic release located from the deck unit to confirm it is responding. Turbine position, time and depth recorded.
7	Data buoy deployed on single point mooring once all turbines have been deployed.
Task	Operation and Maintenance
1	Turbines left in place for 1-3 months.
2	Turbines monitored via remote data buoy.
3	Any loss, damage or suspected movement reported immediately to META and turbine in question recovered for further investigation.
Task	Decommissioning
1	Skipper positions the vessel up-tide of the turbine, clear of the float's path to the surface.
2	Skipper confirms conditions are within limits and the area is clear of traffic.
3	Engines put neutral and acoustic release activated.
4	Float picked up with boat hook and recovery line brought onboard and turbine lifted slowly from the seabed.
5	Once all turbines on the deck of the vessel the data buoy is recovered.
6	Once the site is clear and in safe condition vessel returns to Neyland and all equipment unloaded onto quayside for demobilisation.

Floating Tidal Energy Converter Navigational Risk Controls

Risk Controls		
1.	Devices Specific Risk Controls	- Each micro tidal turbine will have an acoustic release recovery system so will <u>not</u> require a top mark. This minimises obstructions to vessels transiting through the site. - A data buoy will be moored nearby within the Warrior Way site to remotely collect data from the turbines and mark the site. It will be yellow, with a St Andrews Cross and Yellow Flash Characteristic (Fl Y 4s). - The position of the data buoy will be decided with MHPA to ensure it is at a location within the Warrior Way site that doesn't pose a risk to users of the waterway especially as the project duration extends into the recreational season. - The data buoy will monitor the 3 turbines 24/7 and send updates to shore via satellite. Fishtek will be alerted to any loss, damage or suspected movement, in which case the turbine in question will be recovered for future investigation. - Project activities (e.g. Installation, maintenance and Decommissioning activities) coordinated with local activities providers (e.g. Pembrokeshire Performance Sailing Academy) and MHPA advice.
2.	Site Wide Risk Controls	Site-wide risk controls adopted as part of the META project are found in the META Sitewide NRA, Section 10.3. Controls applicable to this deployment are: - Notice to Mariners to inform stakeholders of the floating turbine presence issued by MHPA and shared directly with META Warrior Way stakeholder list - META will engage with MHPA to ensure device is marked and lit appropriately for navigational safety - Detailed Risk Assessment Method Statements (RAMS), specific Tow Plans and Emergency Response Plan will be in place before commencement of works - Compliance with IMO conventions including COLREGs and SOLAS - Signage on device access points - Signage and information on deployment made available at recreational access points e.g. Llanion Cove Slipway and Rudders Boatyard

Appendix 1: Sitewide Navigational Risk Assessment

The following table taken from the [META Sitewide Navigational Risk Assessment](#) shows the top ten risks assessed for Warrior Way. All hazards were assessed to be low (green) risk if appropriate risk controls are in place.

Report No: 18UK1496 -META
Issue No: 03

Commercial-in-Confidence
META NRA

MARICO
MARINE

10.4.1 Warrior Way

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Consequence Descriptions		Risk Overall
					Most Likely (ML)	Worst Credible (WC)	
1	18	META Site: Warrior Way	Grounding	Grounding: Tugs/Service Craft	Not Stranded	Grounding leading to loss of structural integrity, and pollution.	3.88
2	17	META Site: Warrior Way	Grounding	Grounding: Commercial Vessel	Not Stranded	Grounding leading to loss of structural integrity, and pollution.	3.83
3	16	META Site: Warrior Way	Grounding	Grounding Recreational Vessel	e.g. moving out of channel for other traffic, and "touching bottom" (Not stranded).	Grounding leading to sinking or loss of stability	3.82
4	12	META Site: Warrior Way	Contact	Contact with Floating Object: Recreational Vessel	e.g. striking NavAid, possible crew injury.	Striking larger object (e.g. large flotsam) possible multiple injuries, and significant damage leading to sinking	3.65
5	1	META Site: Warrior Way	Collision	Collision: Tugs/Service Craft - Recreational Vessel	Glancing blow, both vessels continue on voyage	Leisure vessel sinks with loss of life	3.48
6	4	META Site: Warrior Way	Collision	Collision: Recreational Vessel - Passenger Vessel / Ferry	Glancing blow, minor damage to both vessels, multiple injuries on leisure vessel	Leisure vessel sinks with multiple loss of life	3.45
7	5	META Site: Warrior Way	Collision	Collision: Recreational Vessel - Commercial Vessel	Glancing blow, minor damage to both vessels, multiple injuries on leisure vessel	Leisure vessel sinks with multiple loss of life	3.45
8	6	META Site: Warrior Way	Collision	Collision: Commercial Vessel - Passenger Vessel / Ferry	Glancing blow, minor damage to both vessels	Multiple injuries on both vessels, major damage to one or both	3.31
9	15	META Site: Warrior Way	Grounding	Grounding: Passenger Vessel / Ferry	P: Moderate - multiple minor injuries	Large ferry grounds: multiple injuries during event, major business disruption	3.22
10	10	META Site: Warrior Way	Contact	Contact with Fixed structure: Tugs/Service Craft	e.g. minor collision with device structure	Serious collision, or anchor fouling leads to capsizing. P: Major	2.96

Appendix 2: Device Specific Navigational Risk Assessment

Device Specific Navigational Risk Assessment			
Site:	Warrior Way	Installation Date:	19 th January 2027
Developer:	Fishtek Marine	Decommissioning Date:	19 th July 2027
Key Navigational Themes (Section 9 of META Sitewide Navigational Risk Assessment)			
Item	Title	META Sitewide Navigational Risk Assessment comment	Any additional device-specific comment
1.	Vessel Routing	The Warrior Way site boundaries encompass the deep-water channel to the east of the Cleddau Bridge. Several stakeholders expressed concern that vessels would be pushed to shallower water to the north. However, in practice, only a small part of the test area will be used at any one time, and it was accepted that this would have minimal impact on vessel routing. (META Sitewide NRA, section 9.1)	Each micro tidal turbine will have an acoustic release recovery system so will <u>not</u> require a top mark. This minimises obstructions to vessels and other watercraft transiting through the site. The final position of the data buoy will be decided with MHPA to ensure it is at a location within the Warrior Way site that doesn't pose a risk to users of the waterway.
2.	Impact Collision/Allision Risk	This assessment has identified three hazards in this category: Collision, contact with floating object, and contact with fixed structure.	Data buoy will have appropriate marking and lighting agreed with MHPA.

		Existing MHPA port control measures will remain effective, including clear channel marking, traffic management and zoning of the Waterway. (META Sitewide NRA, section 9.2)	Notice to Mariners will be issued and promulgated with relevant information regarding the device.
3.	The effects of Tides/Tidal Streams and Weather	No impact is expected on local tidal streams. Devices will be designed for the deployment conditions, and will be well maintained, therefore breakaway is considered unlikely to occur. (META Sitewide NRA, section 9.3)	The turbine bedframes and the data buoy mooring have been designed for the site conditions.
4.	Under Keel Clearance	Will need to be assessed on device specific basis and managed with appropriate controls (temporary AtoNs such as navigational marker buoys, Notices to Mariners, proactive traffic management) to mitigate against impact due to insufficient Under Keel Clearance. (META Sitewide NRA, section 9.4)	The bedframes will sit on the seabed at a height of 2.5m in water depth between 16 – 20m LAT, therefore will not impact under keel clearance.
5.	Impact on Fishing Activity	There is no large-scale commercial fishing activity at Warrior Way. Fishers will be made aware of deployment through Notice to Mariners issued and sent via direct email to those who have registered specific interest in META Warrior Way activities. (META Sitewide NRA, section 9.5)	n/a
6.	Impact on Recreational Activity	This Warrior Way site is intensively used for recreational purposes, both individuals in private vessels, and organised groups. Jet skis also commonly use the area. The area is regularly used for youth sail training and other activities, and therefore the vessels involved may be under the control of very inexperienced helmsmen. Regular exercises such as planned and controlled capsize drills are also regularly undertaken. There was concern raised at the stakeholder workshop that the extent of the Warrior Way test site boundary would significantly impact on these activities.	Each micro tidal turbine will have an acoustic release recovery system so will <u>not</u> require a top mark. This minimises obstructions which would impact recreational activity. The final position of the data buoy will be decided with MHPA to ensure it is at a location within the Warrior Way site that doesn't

		However, it is noted that in practice only one device will be deployed at any one time, which will in effect be a “point” obstruction at one location within the wider test site boundary. Risk, and inconvenience to other users can be significantly reduced through the designed in measures such as clear promulgation of the device location (Notices to Mariners etc.), marking with AtoNs (buoys) and in the case of short period deployments of certain devices provision of guard boats. (META Sitewide NRA, section 9.6)	pose a risk to users of the waterway. Appropriate marking and lighting for the data buoy will be agreed with MHPA to ensure it is visible to recreational users. Signage and information on deployment made available at recreational access points e.g. Llanion Cove Slipway and Rudders Boatyard.
7.	Interaction with Subsea Cables	No existing subsea cables are relevant to any of the sites. (META Sitewide NRA, section 9.7)	n/a
8.	Impact on Search and Rescue and Emergency Response	Due to the small-scale nature of the devices to be deployed, there is not expected to be any impact on SAR and emergency response. (META Sitewide NRA, section 9.8)	n/a
9.	Impact on Communications, Radar and Positioning Systems	No impacts are anticipated. (META Sitewide NRA, section 9.9)	n/a
10.	Cumulative and In-Combination Effect	Increased activity expected in the Milford Haven Waterway due to other projects, however it is not considered to have a significant impact in combination with the META test areas. (META Sitewide NRA, section 9.10)	n/a