

# Galway Bay Test and Demonstration Site

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## Procedure Manual

These procedures are subject to change from time to time. The latest version will be the version available for download from [www.smartbay.ie](http://www.smartbay.ie)

# Revision Control Page

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## 1. Introduction

The Marine Institute and Sustainable Energy Authority of Ireland work in partnership to manage the Galway Bay Test and Demonstration Site. The foreshore license for the test site is held by the Marine Institute and funding for activities, operations and ongoing maintenance of the site is available through SEAI. SmartBay Ireland is contracted to oversee the day to day management and operation of the test site.

This document explains the procedures to be followed by any company (the *developer*) wishing to use Galway Bay Test and Demonstration Site (the **GBTDS**) to test their ocean energy conversion prototypes or devices. It also states the “Conditions for Use” of those facilities, as well as the services provided by SmartBay to assist the users of the GBTDS.

An outline is provided on the legal, marine safety, environmental and operation conditions the users must satisfy prior to a device being granted access to the GBTDS.

This site provides developers with an instrumented, licensed test site which is well marked by day and night with a cardinal buoyage system to prevent damage to the device or danger to vessels through unintentional transit of the area. A wave measuring buoy is installed on site providing a record of wave conditions at the site. Access to the site is available using smaller vessels from Spiddal and for larger vessels from Galway Dock. A shore viewpoint is accessed from the main Galway-Spiddal road. For surface (buoyant) devices, developers can supply their own mooring system or SmartBay can procure (details on the desired mooring must be presented). Developers may also provide their own data acquisition and transmission system or if practicable utilise existing communications facilities, provided by SmartBay. Wave measurements and modelling of the site indicate its suitability for scaled devices of around ¼ scale.

Testing periods for devices are expected to be in the region of 3 to 6 months; longer testing periods will require an extension request subject to pre-approval. Developers applying for use of the site for a testing programme should complete an **application form** which is available on SmartBay’s website and in the Appendix. Applications will be accepted by mail, or email, for initial assessment.

SmartBay technical and operational personnel will provide direction, support and advice to developers throughout all stages of device validation trials. Support will be provided from: initial concept evaluation; planning; funding application submittal; pre-deployment; vessel selection; mobilisation; Operations and Maintenance; decommissioning; and in conjunction with the Hydraulics & Maritime Research Centre (HMRC) Cork independent device validation.

## 2. Criteria for approval of devices for testing

### 2.1. Insurance

The Developer shall have and maintain full and comprehensive insurance policies (including marine risks) in respect of all customary liabilities and risks undertaken by the Developer in connection with the deployment and trial of the device within the test site.

Developers will be required to hold the following levels of insurances:

- Employers liability: €13,000,000 each and any one event.
- Public Liability: €6,500,000 each and any one event.
- Professional Liability: €6,500,000 each and any one event.

Copies of such policies and up-to-date certificates of insurance shall be provided with the application or, that not being the case, within three weeks of further documentation being requested from SmartBay for the complete initial assessment of the application. No device, testing or access shall be permitted in the test site if these insurances are not valid at any point during the trial, deployment or recovery.

### 2.2. Hull construction / certification

Hull design and construction must comply with relevant standards in force at the time of application submission and undertaken, or approved, by a recognised and approved contractor, naval architect or marine surveyor. Detailed specification of the device and evidence of competence for design and construction, as well as the report of any inspection or certification made by a third party naval architect, marine surveyor or accreditation bureau, are to be submitted to SmartBay with the signed application or, that not being the case, within three weeks of further documentation being requested from SmartBay for the complete assessment of the application.

SmartBay reserves the right to have the device inspected by a certified marine surveyor at any time, at the expense of the developer, in case the information provided is deemed insufficient to guarantee the safety of the mooring, the device and the test site, or if visual inspection to the device reveals discrepancy to the plans.

### 2.3. Mooring system (where applicable)

The mooring system shall be designed for the expected loading and in accordance to the appropriate standards in use at the time of application submission. All mooring materials must be certified, or proven as such. The mooring design is to be undertaken by recognised and competent third party naval architect, marine surveyor or accreditation bureau. The design and the report of any inspection or certification made by a third party naval architect, marine surveyor or accreditation bureau are to be submitted to SmartBay for

analysis with the signed application or, that not being the case, within three weeks of further documentation being requested from SmartBay for the complete assessment of the application. All welding shall be carried out by certified welders.

SmartBay reserves the right to have the moorings inspected by a certified marine surveyor at any time, at the expense of the developer, in case the information provided is deemed insufficient to guarantee the safety of the mooring, the device and the test site, or if visual inspection to the moorings reveals any discrepancies between the approved mooring design and the moorings provided.

The developers shall also indicate, at this stage, whether they will provide moorings or if moorings will be ordered from SmartBay.

#### **2.4. Lifting equipment**

The developer shall ensure that each lifting appliance and all its fittings and attachments, including each piece of lifting gear shall be subjected to an independent thorough examination by a competent person. Independent examinations must be carried out in any of the following circumstances:

- ( a ) during assembly and prior to mobilisation and deployment , as appropriate, and before being used for the first time;
- ( b ) following repair of defects affecting the continued safe working of the appliance, its fittings or attachments or the lifting gear, and before being returned to service; and
- ( c ) at least once in every period of six months commencing on the day after the most recent examination at subparagraph (a) or (b) of this paragraph.

"lifting appliance" means any plant designed and used exclusively for the lifting, lowering, movement, support or suspension of persons, goods or materials and shall include a hoist or lift.

"lifting gear" includes:

- Chain slings and similar pieces of equipment.
- Ropes used for: tethering, raising, lowering, dragging, suspending and supporting.
- Any ring, spreader beam, bar or frame,
- Other items such as: basket, cage, cradle, container, link, hook, plate clamp, shackle, swivel or eye bolt, twist locks, patent clamp, clip, grip, wedge and socket, and similarly functioning devices.

## 2.5. Deployment and recovering strategy

Deployment and recovery strategies are to be outlined in writing, providing details of vessel(s) requirements, means of deployment and recovery, duration and weather limits for deployment and recovery with the signed application, or within a reasonable time for vessel procurement and mobilisation. SmartBay may propose, discuss and agree with the developer alternative plans for deployment or recovery.

## 2.6. Technical

Where applicable the compliance of device development and testing programmes, with the broad outline described in the Marine Institute / Hydraulic and Marine Research Centre (HMRC) document “Ocean Energy Development and Evaluation Protocol”, will also be evaluated. Proof of previous developments, such as tank testing at lower Technology Readiness Level (TRLs), validated by a third party should be provided if requested.

A copy of the proposed testing programme aims and objectives and expected duration, as well as a broad outline of methodology to be followed, will be required with the signed application or, that not being the case, within three weeks of further documentation being requested from SmartBay for the complete initial assessment of the application.

Where possible as many components and sub-systems should be bench tested, and as a full system alongside prior to deployment.

## 2.7. Safety

The ocean energy conversion device must comply with the following:

- Buoyant-type devices shall be fitted with a marine standard yellow flashing light, with a minimum nominal range of 2 nautical miles, flashing once every ten seconds at a minimum of three metres above the waterline, whenever possible.
- Buoyant-type devices shall have a radar reflector compliant with ISO8729 fitted at least three metres above the waterline, whenever possible.
- Buoyant-type devices shall have the hull painted in bright orange, yellow or red.
- Buoyant-type devices shall have, whenever possible, a boarding ladder facilitating easy access to be fitted with adequate handrails, harness clipping eyes and markings to be provided as per the appropriate standards in effect at the time of the application.
- All devices shall have towing eyes fitted with towing strops where practicable and to an agreed length to allow for towing/recovery, complying with the appropriate standards in effect at the time of application.

- All devices shall be accompanied by a detailed emergency plan and procedure, outlining actions to be taken in case of catastrophic failure, drift or sinking of the device.
- Buoyant-type devices shall, to the maximum possible and practical extent, have some or all compartments fitted with bilge alarms and sufficient battery capacity must be provided to allow monitoring and operation of the device safety systems for extended periods. The batteries should be located where they are least likely to be immersed in the event of flooding.
- All devices shall use biodegradable oils only. Material Safety Data Sheets (MSDS) must also be provided for all hazardous materials being used or stored in the device.

In addition to the above, the device developer must ensure that:

- Written approval for access to the site has been received from SmartBay before entering the test site.
- Site access procedures are followed at all times.
- Only fully licensed work vessels are to be used and such vessels must be pre-approved by SmartBay.
- All staff employed by the developer should be suitably qualified and trained.
- Developer staff must never visit the GBTDS alone and must be accompanied by SmartBay personnel at all times when on the site.
- No attempt should be made to board moored devices when sea conditions are deemed unsuitable.
- Where practicable, moored devices should have full first aid facilities and emergency voice communication system.

A log of site visits and operations will be maintained by SmartBay (a log template is shown in Appendix A). GBTDS users are responsible for their own safety, that of their staff and the safety of visitors invited by them to the GBTDS. GBTDS users must comply with SmartBay's safety management procedures which includes but is not limited to: Risk Assessments, Incident Reports, Safe Systems of Work (SSW), Near Miss Reporting, Tools-Box talks, Permit to Work. Relevant overarching HSE bridging documentation which will be developed in conjunction with SmartBay GBTDS users and contractors e.g. vessel owners, dive companies. Comprehensive risk assessments must be developed prior to undertaking mobilisation, deployment and routine operations & maintenance activities within the site.

### 3 Outline procedure for deployment of devices at Galway Bay TDS

**1** The developer completes and submits an application form and copies of required documentation such as a detailed time-bound work plan to SmartBay (example included in Appendix B). A summary of the device validation trials should be provided at this stage, as well as a description of the assistance required from SmartBay and a list of SmartBay's infrastructure that will be used if any, or submitted within three weeks of being required to produce these documents. The developer must also submit at time of application, or within three weeks of being required to, the following documents: insurance certificates, emergency plan and procedures.

**2** The application will be initially assessed for technical competence and certification.

**3** If necessary, the developer may be asked to submit additional documentation.

**4** The complete application is assessed for technical competence and certification by a vetting panel and for suitability of proposed testing programme at the GBTDS.

**5** SmartBay will review the complete application.

**6** A **contract** with SmartBay Ireland Ltd will be discussed with the developer.

**7** The **contract** with SmartBay Ireland Ltd covering permission to use the test site, services being provided and all the conditions pertinent to this procedure manual (including emergency recovery operations, device removal, delays during programme) must be signed by the developer at a minimum of three weeks prior to any works commencing at the GBTDS, once the application is successful.

**8** If necessary, SmartBay will appoint a surveyor to perform inspections on the device or moorings, to ensure they are fit for purpose, seaworthy and comply with SmartBay's safety regulations, and to the plans and documentation submitted with the application. A marine notice detailing installation details and duration will be issued prior to the deployment of moorings and device. The British Admiralty Hydrographic Office shall also be notified.

**9** The device can then be deployed at the site location with SmartBay's assistance or supervision.

**10** The developer must give one month's prior notice to SmartBay when testing will be completed.

**11** Depending on the terms of the contract, the developer, or SmartBay with the assistance of the developer, will remove the device and any associated equipment from the test site and reinstate the test site to its original condition as it was prior to



deployment. This must be done within a two week period after testing has been completed (weather permitting); a longer duration may be requested but must be agreed with SmartBay.

**12** The contract is then terminated by SmartBay.

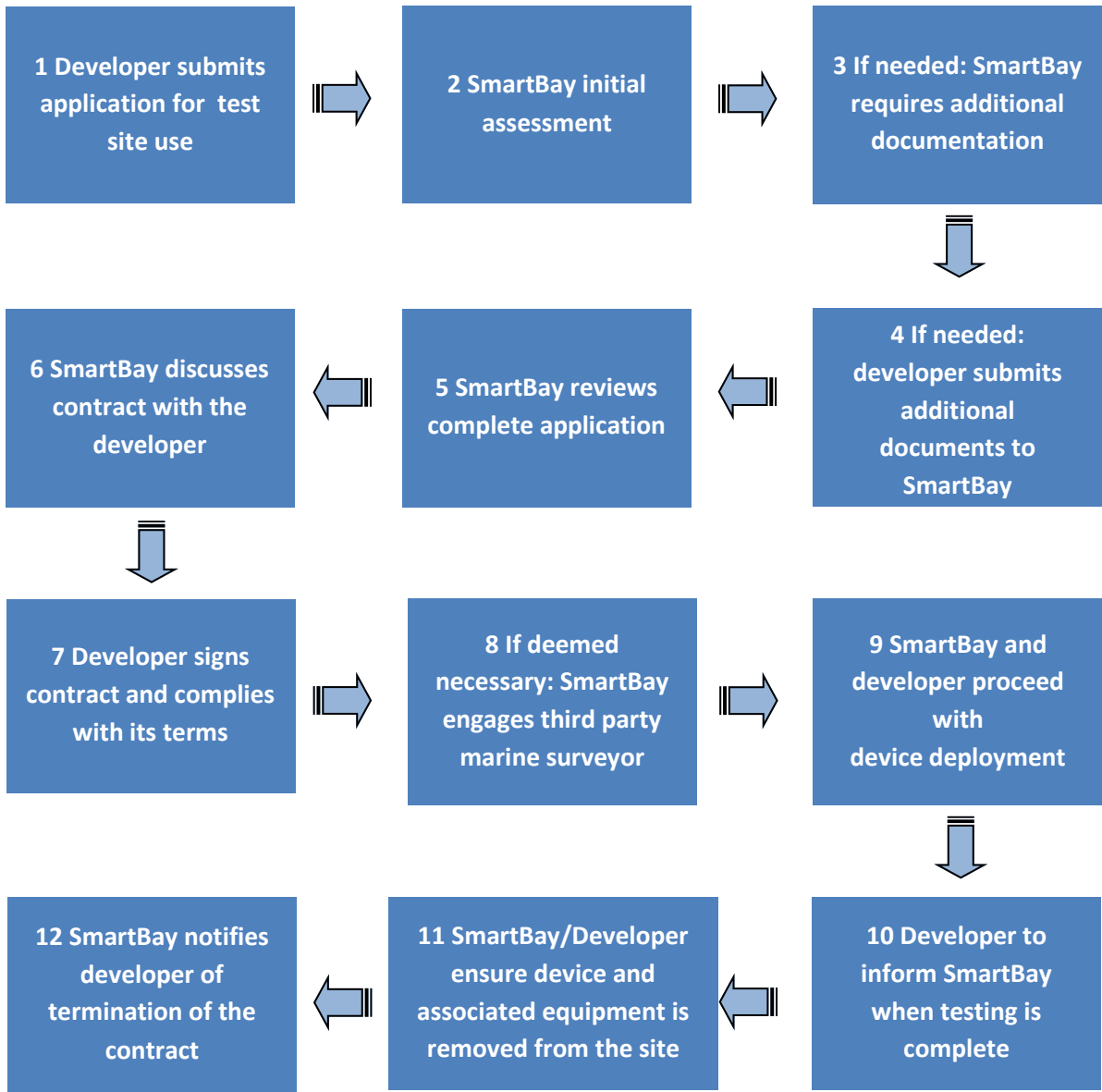


Figure 1 –Procedure for deployment of devices at Galway Bay TDS

# Appendix A: Example of site visit log

# Galway Bay Test and Demonstration Site



## Site visit log

<b>Date:</b>		<b>Log No.:</b>	
<b>Permit No.</b>		<b>Job description</b>	
<b>Company</b>			
<b>Personnel present</b>			
<b>Vessel(s) deployed</b>			
<b>Departure time</b>		<b>Return time</b>	
<b>Wave height*</b>		<b>Wave period*</b>	
<b>Wave direction*</b>		<b>Wind speed*</b>	
<b>Wind direction*</b>		<b>Visibility</b>	
<b>Other remarks</b>			
(*Data buoy information to be attached if available)			
<b>Activities Onsite, including positions of deployments and deposits</b>			
<b>Any damage or defects apparent on device during visit</b>			
<b>Other remarks or observations</b>			
<b>Signed</b>			

# Appendix B: Galway Bay TDS application form

# Application form for use of Galway Bay Test and Demonstration Site

## Developer details

Applicant:

Business  
Address:

Contact

Name:

Telephone:

Fax:

Email:

Web site

## Device details

Device name

Device description

Proposed mooring configuration (including schematics of mooring and device)

Company/device history (description of previous trials, learnings):

Details of device development team (provide roles and responsibilities, relevant qualifications and experience):

## Proposed testing programme

A proposed device validation trial work plan including: objectives and expected duration (with proposed start and finish dates) are to be attached to the application form or provided at least three months prior to testing. An example of headings around which the report should be constructed, where applicable, has been given hereunder.

- Hull design and construction and in particular hull seaworthiness and survival strategies in accordance with local wave climate/conditions. Please include detailed specification of the device and evidence of competence for design and construction, as well as the report of any inspection or certification made by a third party naval architect, marine surveyor or accreditation bureau.
- Mooring and cable connection considerations (if applicable).
- Power Take Off (PTO) performance and reliability. To include: Description of power take off system and method of energy dissipation, Expected peak and average power output of generator kW, Generator type – AC, DC, number of phases, rated voltage, amp etc, Invertors/transformers details, Dump load system and power dissipation capacity kW, Battery size and type.
- Deployment plan.
- Service, maintenance and operational plan, including access at sea.
- Decommissioning and recovery plan, including proposed timelines.
- Detail parameters to be recorded and method of recording and data recovery.
- Details of the metocean conditions (waves, wind, currents etc.) that the device will need to encounter to yield a successful testing programme.
- On board power requirements (Description of house load energy system Method of energising and endurance/battery size, expected power consumption during normal operations).

Guidance for a proposed testing programme can be found within: “Guidelines for the development & testing of wave energy systems (HMRC 2010)”. Developers should indicate compliance to this document with regard to past and planned testing programmes. Developers should also confirm how the development programme has followed Technology Readiness Levels, a detailed guide of which can be found within: “ESBloe-WAV-11-027, Appendix 2 Technology Readiness Levels for Supply Chain Study for WestWave”.

## Safety

- Design and construction are to be as outlined in the document entitled “Galway Bay TDS Procedure Manual”. Please attach reports, certificates and evidence with the this application.
- Mooring design is to be undertaken by a competent party. Please attach certificates or other evidence of similar authority that this has been



performed with the application, or upon request.

- The mooring materials are to be certified. Please provide evidence of such with the application, or within at least four months prior to testing upon request.
- Deployment and recovery strategy document is to be submitted with the application, or within at least three months prior to testing.
- An emergency plan and procedure document must be provided, including details of available recovery vessels, please submit with the application or upon request.
- Provisions for ensuring adequate visibility of the device must be provided, details of which are to be submitted with the application.

Off-station alarm details, if applicable

Provision for access by personnel:

Please return this form to along with a time bound and detailed work plan for the device validation trials to:

SmartBay GBTDS Application  
SmartBay Ireland Ltd.,  
Parkmore Business Park West,  
Galway,  
Co. Galway,  
Ireland.

Or email: [OceanEnergy@SmartBay.ie](mailto:OceanEnergy@SmartBay.ie)