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Programme Area: Marine

Project: PerAWAT

Title: Consent Licence for Installation of 1:10th Scale Tidal Turbines in Strangford Lough, Northern Ireland

Abstract:

This report describes the application process and outcome of consents of a FEPA licence for installation of a test platform and two 1:10th scale tidal turbines in Strangford Lough, Northern Ireland. This forms the first deliverable of Work Group 4, Work Package 5 (WG4 WP5 D1). The primary objective of this deliverable is to gain a successful application for the FEPA licence for installation of test platform and turbines. In order for the project to proceed and for legal mooring in Strangford Lough, the appropriate licence, or an exemption, needs to be applied for and granted. Without this licence or exemption the test platform cannot legally be moored in Strangford Lough.

Context:

The Performance Assessment of Wave and Tidal Array Systems (PerAWaT) project, launched in October 2009 with £8m of ETI investment. The project delivered validated, commercial software tools capable of significantly reducing the levels of uncertainty associated with predicting the energy yield of major wave and tidal stream energy arrays. It also produced information that will help reduce commercial risk of future large scale wave and tidal array developments.

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Energy Technologies Institute

PerAWaT (MA1003)

WG4 WP5 D1: CONSENT LICENCE FOR INSTALLATION OF 1:10TH SCALE TIDAL TURBINES IN STRANGFORD LOUGH, NORTHERN IRELAND

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Other Participants Involved:	Laura Finlay
Version:	2.0
Date of submission:	13th April 2011

Executive Summary

This report describes the application process and outcome of consents of a FEPA licence for installation of a test platform and two 1:10th scale tidal turbines in Strangford Lough, Northern Ireland. This forms the first deliverable of Work Group 4, Work Package 5 (WG4 WP5 D1). The primary objective of this deliverable is to gain a successful application for the FEPA licence for installation of test platform and turbines.

On order for the project to proceed and for legal mooring in Strangford Lough, the appropriate licence, or an exemption, needs to be applied for and granted. With this licence or exemption the test platform cannot legally be moored in Strangford Lough.

This work has been undertaken through close collaboration between the University of Edinburgh and the Queens University Belfast. A licence application was made on the University of Edinburgh's behalf by the Queens University Belfast and Marengo to NIEA and a licence exemption was granted due to the short time scale of the tests and the nature of the floating platform.

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1.0 Introduction

1.1 Project overview

A series of field tests with two 1:10th scale horizontal axis tidal turbines is to be conducted in Strangford Lough, Northern Ireland in order to support the verification of numerical models and to provide experimental support for the planning of tidal current arrays. Experimental tests will be conducted to ascertain the effects of torque and thrust on tidal turbines within a simulated array formation and the interactions and wake effects of this formation.

This work is being conducted as part of the PerAWaT Work Group 4, Work Package 5. This work package aims to ascertain the optimum position of tidal turbines when placed in an array configuration and how the placement and positions of the turbines affect torque, thrust and wake interactions. The first deliverable of this work package to obtain consent licence for installation.

A buoyant twin-hulled test platform (12m x 6m) will be moored in Strangford Lough with four anchors. Two mono-strut 1.2m diameter 3-bladed fixed pitch turbines will be fitted to the platform and will be held with their central axis 2 metres below the free surface. The relative position of the rotor centre will be mechanically altered to provide longitudinal and lateral separations. One turbine will remain in a fixed position whilst the second turbine will be moved to a maximum of 8 longitudinal and 3 lateral separations. Testing will take place on the flood tide with turbines in altered positions over the full neap – spring tidal cycle. Installation and decommissioning of the test platform and turbines will take place in accordance with the terms set out by the consents licence.

These experiments will be carried out with a team of personnel involved. The experiments will be coordinated by University of Edinburgh employees and the team will consist of these members also including technical staff, PhD students and academics from the Queens University Belfast and Wave Barrier Ltd employees. The overall consenting process has involved consultation with key stakeholders and the consenting agency, Northern Ireland Environment Agency (NIEA).

Calibration and set up of the test platform, turbines and associated surveying equipment will take place at the privately owned Montgomery Lough, Ballynahinch (permission has been granted by the owner). All experimental sea trial work will be conducted at the entrance to Strangford Lough in Strangford Narrows (a deep channel approximately 8km long between the towns of Strangford and Portaferry) and the test platform will be moored close to the east coast of the Lough offshore of Portaferry. Strangford Lough has been selected as the ideal site for these tests due to its relatively sheltered position from the conditions of the Irish Sea by the Ards Peninsula and has tidal flows that reach up to 4 m/s on a spring tide.

1.2 FEPA Licence

The Food and Environment Protection Act (FEPA) 1985 was created to authorise the making in an emergency of orders specifying activities which are to be prohibited as a precaution against the consumption of food rendered unsuitable for human consumption in consequence of an escape of substances; to replace the Dumping at Sea Act 1974 with fresh provision for controlling the deposit of substances and articles in the sea; to make provision for the control of the deposit of substances and articles under the sea-bed; to regulate pesticides and substances, preparations and organisms prepared or used for the control of pests or for protection against pests; and for connected purposes [1].

In order to moor a test scale marine energy converter it is necessary to obtain the appropriate licensing in advance. Licence authorities are set up to protect the marine environment. FEPA licences within the UK are issued under powers confirmed by Part II of the Food and Environment Protection Act (FEPA) 1985. This ensures that the necessary statutory means to meet the UK's obligations under both the London (1972) [2] and OSPAR (1992) [3] conventions which address the prevention of marine pollution from dumping at sea are provided by FEPA. Licences will be issued in order to protect the marine environment, the living resources which it supports and human health and to prevent interference with legitimate users of the sea [4].

A FEPA licence is required for deposits of substances or articles in the sea or under the sea bed and construction work which includes deposition of materials below the

mean high water spring tide. Some minor works of construction may have exemption from FEPA licensing but an application should always be submitted for assessment of the need of licensing. Exemption from the FEPA licence may be granted by the licencing authority where a licence is not required or where a licence is not required if the applicant satisfies conditions specified in the order.

Operations involving the disposal of any material at sea or under the seabed below the tidal limit of Mean High Water Springs (MHWS) will not normally require a waste management licence provided they are covered by a FEPA licence. Some activities may be exempt from a FEPA licence under the terms of the Disposal at Sea (Exemptions) Order 1985 (as amended) [5].

In many cases, such as construction, a detailed scientific evaluation to prevent or minimise any adverse environmental effects is required in support of the application [5].

FEPA licence authorities within the UK are as follows:

- England: issued by the Marine Management Organisation [6]
- Wales: issued by the Marine Consents Unit (MCU) within the Welsh Assembly Government [7]
- Scotland: issues by Marine Scotland - Licensing Operations Team (MS-LOT) (In Scotland from April 2011 Part 2 of the FEPA and Part 2 of the Coast Protection Act 1949 (CPA) have been replaced by the Marine (Scotland) Act 2010. The Scottish Government is now responsible for the new marine licencing system for activities carried out in the Scottish inshore regions of UK waters [8]).
- Northern Ireland: issued by Northern Ireland Environment Agency (NIEA).

1.3 FEPA Licencing within Northern Ireland

Within Northern Ireland, the Department of Environment (DOE) is responsible under Part II of the Food and Environment Protection Act (FEPA), 1985 to control deposit of articles in the sea. The Department is responsible for controlling all deposits into the sea up to the MHWS tidemark.

The Department operates a licensing system under the FEPA, which regulates the deposit of substances or articles in Northern Ireland's territorial waters (from MHWS out to 12 nautical miles), or under the seabed. This includes dredged material. [9]

In order to obtain a FEPA licence within Northern Ireland an application form should be requested from the Northern Ireland Environment Agency (part of DOENI). Further environmental information may also be requested for submission in support of the application. The application then goes through a consultation process with a number of relevant organisations in order to aid the determination of the licence and identify any conditions that may be included in a licence.

In order to fulfil the objectives of FEPA Part II, NIEA consult with a number of other organisations on each application. The bodies concerned are:

- NIEA, Natural Heritage (advice on conservation issues)
- NIEA, Built Heritage (advice on preservation of shipwrecks and marine archaeology)
- Department of Agriculture and Rural Development (DARD) - Fisheries Division (advice on shellfish and fin fish interests)
- Maritime and Coastguard Agency (advice on navigational issues)
- The Crown Estate
- Local Authorities (where planning consent is not required).

If a licence is not granted an appeal may be made in writing. A licence may vary or be revoked if It appears that there is a breach of any of its conditions when there is a change in circumstances relating to the marine environment, the living resources that it supports or human health or because of increased scientific knowledge of the above factors. [9]

2.0 Methodology

An application was submitted to NIEA for a FEPA licence to moor the PerAWaT test platform and conduct field tests with two 1:10th scale tidal turbines in Strangford Lough on behalf of the University of Edinburgh by Queens University Belfast and their subcontracted environmental consultants, Marengo.

- Meetings and discussion took place between University of Edinburgh staff and the Queens University Belfast staff regarding the licence application and project specifications,
- The Queens University Belfast and Marengo compile FEPA licence application,
- Marengo submit application for FEPA licence,
- Meetings take place between Marengo and the Queens University Belfast and NIEA to discuss the FEPA licence application,
- NIEA send licence application to external organisations (NIEA - Natural Heritage, NIEA - Built Heritage, Department of Agriculture and Rural Development - Fisheries Division, Maritime and Coastguard Agency, The Crown Estate, Local Authorities),
- FEPA licence exemption is granted by NIEA with one condition: a marine mammal observer should be present during all field tests,
- FEPA licence exemption is sent to external organisations (listed above) by NIEA.

3.0 Acceptance Criteria

Acceptance criteria of Deliverable 1 of Work Group 4 Work Package 5 is the successful application of the consent licence for installation.

A FEPA Licence Exemption was granted by NIEA as the project is considered exempt activity under the Deposition in the Sea (Exemption) order (Northern Ireland) 1995. This is due to the test platform essentially being a 'floating vessel' and as such under article 18 of the order the deposits of temporary moorings are exempt activity. Also, under article 22 of the order the deposits of any scientific experiment or survey are exempt activity. The temporary deployment of the test turbines on the vessel has therefore been deemed exempt also.

One condition of the FEPA licence exemption is that a marine mammal observer should be present during all field tests. Discussions have taken place with staff at the Queens University Marine Laboratory, Portaferry to conduct training for all personnel working on the PerAWaT project in Portaferry. This training will take place prior to any field work.

4.0 The Crown Estate

The Crown Estate is the property and land owned by the Crown, including over half of the UK's foreshore all of the UK's seabed from the Mean Low Water Mark to the 12 nautical mile limit.

The Crown Estate had rights invested in it by The Energy Act 2004 to lease the generation of renewable energy on the continental shelf within the Renewable Energy Zone out to 200 nautical miles. Leases, licences and consents for activities and developments on Crown Estate land such as offshore renewable energy projects are therefore issued by the Crown estate as the landowner.

4.1 Crown Estate Licencing

Communication took place between John Callaghan (Programme Manager for Wave and Tidal, Crown Estate) and Laura Finlay regarding mooring of the PerAWaT test platform within Strangford Lough. Queens University Belfast had previously applied for and granted by the Crown Estate a mooring licence for the Ocean Flow Energy device Evopod. The FEPA licence exemption states that the PerAWaT test site at Strangford Lough is adjacent to the Evopod site. Therefore an amendment to the QUB / Evopod mooring licence has been made by the Crown Estate to take into account the PerAWaT test platform, in the place of a requirement of a separate PerAWaT mooring licence.

5.0 Environmental Considerations

The PerAWaT test platform will be moored adjacent to the Evopod device site, taking this and the temporary floating nature of the platform into account, an Environmental Impact Assessment was not required. This was in agreement with FEPA licence exemption stipulations and also taking into account that a Marine Mammal Observer will be present on board the test platform at all times during the PerAWaT experiments.

Ocean Flow Energy commissioned environmental consultants Marengo to carry out a 'significant impact' study for the deployment of their 1/10th scale Evopod device. Regarding sea mammal impact with turbines it was concluded that:

"Potential collision with rotating blades: EVOPOD is a 1/10th scale device with a four blade turbine of 1.5 m in diameter with potential maximum tip speed of 5.9 ms⁻¹. Significant monitoring work has been undertaken in respect of the SeaGen project.

Publicly available SeaGen reports indicate no significant impact to marine mammals, including common seal. Further published information from Scottish Natural Heritage Scientific Advisory Committee (2009) suggests that the physical effects of rotating turbines can in fact carry smaller, more buoyant species, such as diving seabirds out of the immediate path of the blades thereby avoiding potentially fatal strikes.

Also during the EVOPOD device trials in 2008/2009 no collision incidents were recorded."

6.0 Navigation

The Commissioner of Irish Lights is the General Lighthouse Authority for all of Ireland. The Commissioner of Irish Lights carry out all obligations of the British and Irish Governments in relation to the position of Aids to Navigation around the coast of Ireland.

During the consultation period of the PerAWaT FEPA licence application by the Northern Ireland Environment Agency, the Commissioner of Irish Lights reviewed the application and stated their requirement of navigation lights to be displayed on the PerAWaT test platform at night when moored in Strangford Lough. These considerations have been taken into account by Wave Barrier Ltd who is fitting the appropriate navigation lights to the test platform.

7.0 Future Tasks and Deliverables

The next deliverables within the work package are as follows:

- Deliverable 2: Test schedule and test system design ,
- Deliverable 3: Completed test rig equipment constructed and assembled with rotors installed,
- Deliverable 4: a) Correctly located test system, b) Test system calibrated: report and calibration database,
- Deliverable 5: a) Data sets over the prescribed range of longitudinal and lateral separations, b) Test report,
- Deliverable 6: System removed from site,
- Deliverable 7: Report on turbine interference parameters.

8.0 Summary

In order for experimental field tests to take place in Strangford Lough as part of PerAWaT Work Group 4 Work Package 5, a FEPA licence or FEPA licence exemption was required in order to moor the test rig within the lough. This was applied for on the University of Edinburgh's behalf by the Queens University Belfast and Marengo. A FEPA licence exemption was granted on the grounds of the temporary time scale of the project and the nature of the floating platform.

References

- [1] (2011) Legislation.gov.uk, Food and Environment Protection Act (1985), [online] Available: <http://www.legislation.gov.uk/ukpga/1985/48>
- [2] (2011) International Maritime Organization, London Convention and Protocol, [Online]. / Available: <http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx>
- [3] (2011) OSPAR Commission [Online]. Available: <http://www.ospar.org/>
- [4] (2011) Department of Environment Northern Ireland, Marine construction and deposits in the sea / FEPA guidelines [Online]. Available: <http://www.doeni.gov.uk/niea/water-home/quality/marine/marine-license/fepa-license-guidance.htm>
- [5] (2011) The Scottish Government, Food and Environment Protection Act (FEPA) [Online]. Available: <http://www.scotland.gov.uk/Topics/marine/Licensing/marine/fepa>
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- [7] (2011) Welsh Assembly Government, Marine Licencing [Online]. Available: <http://new.wales.gov.uk/topics/environmentcountryside/consmanagement/marinefisheries/licencing/?lang=en>
- [8] (2011) The Scottish Government, Marine Scotland [Online]. Available: <http://www.scotland.gov.uk/Topics/marine/Licensing/marine>
- [9] (2011) Department of Environment, Northern Ireland Environment Agency, Marine Construction and Deposits in the Sea [Online]. Available: <http://www.doeni.gov.uk/niea/marine-license>

Appendix 1

Our ref: 327/03/11/pma

1st March 2011

Mr Trevor McQuoid
Marine Assessment & Licensing Team
NIEA
17 Antrim Road
LISBURN
BT28 3AL

Dear Trevor

UNIVERSITY OF LISBURN
- 4 MAR 2011
RECEIVED


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QUB & EDINBURGH UNIVERSITY TIDAL TURBINES SCALE DEVICES – FIELD TESTING FEPA LICENCE EXEMPTION REQUEST

Trevor following our meeting on 9th February I have compiled information in respect of the above project. We would request that NIEA MALT consider this project for a FEPA Licence exemption.

Project Overview

A series of towing tests with 1/10th scale horizontal axis tidal turbines is to be conducted in Strangford Lough, Northern Ireland, in order to support the verification of numerical models and to provide experimental support for the planning of tidal current arrays for the PerAWaT project (Performance Assessment of Wave and Tidal Array Systems).

A buoyant test twin hulled platform ('Ally Cat') will be held in position by four anchors (train wheels). Ally Cat measures 12 m x 6 m and is essentially a floating vessel (Figure 1). Two mono-strut 1.2 m diameter 3-bladed fixed pitch 1kw turbines will be fitted to the platform and will be held with their central axis 2 m below the free surface. The relative position of the rotor centre will be mechanically altered to provide longitudinal separations of up to 8 diameters and lateral separations of up to 3 diameters. Figures 2.1 & 2.2 are schematics of the Ally Cat with scale turbines in-situ design. Figure 3 is a schematic of the devices to be tested. A series of tests will be carried out with the rotors in altered positions over the full neap - spring tidal cycle on the flood tide. A maximum of two devices will be attached to Ally Cat at any given time.

The Ally Cat will be installed by being towed out to the site from Ringhaddy Marina and anchored in place. Ally Cat will be constructed on shore at the Marina – no construction will take place in the inter-tidal zone. Moorings will be laid from a barge by a suitably qualified sub-contractor. Figure 4 details the mooring design. Upon completion of the test cycle the test rig will be retrieved and the installation process will be reversed.

The experiments will be measuring the impact of thrust, torque and wake effects of tidal turbines. This will be conducted by using acoustic Doppler measuring devices which will be attached to the test rig, and a torque sensor which will be contained within the turbine systems. The test platform will be manned during operation of measuring equipment with access provided by a small vessel.

These experiments will be carried out with a team of personnel involved. The experiments will be coordinated by University of Edinburgh employees and the team will consist of these members also including technical staff, PhD students and academics from Queens University Belfast. This series of experiments will be conducted within a team only and individual or lone work onboard the platform is not permitted under any circumstances

DIRECTORS

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G SAVIDGE BSc PhD
B REID C.DIR

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Company Registered in Northern Ireland No. NI20095



All experimental sea trial work will be conducted within Strangford Narrows, at the entrance to Strangford Lough. The platform will be moored close to the east coast of the lough adjacent to the existing EVOPOD mooring (Latitude: 54° 22' 86" N Longitude: 05° 33' 14" W).

Calibration and set up of the towing rig will take place at Montgomery Lough, Ballynahinch (privately owned).

Test Schedule

Installation of test platform to Montgomery Lough	early April 2011
Lake test schedule	April 2011
Installation of test platform to Strangford Lough	mid-May 2011
Sea test schedule	mid-May to August 2011
Retrieval of Ally Cat and moorings etc.	late August 2011

Environmental Impact

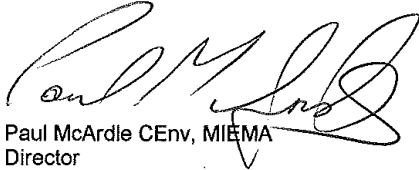
As you are aware a significant environmental report was prepared in respect of the EVOPOD device. Essentially the devices to be tested in this project are the same as the EVOPOD device and are also 1/10th scale models. The environmental assessment for EVOPOD concluded that there would be no significant impact. Given the similarities between the project and the fact that Ally Cat is essentially a moored floating vessel no significant environmental impacts are envisaged. In addition, the project period is short at approximately three months and all equipment associated with the tests (including moorings will be removed).

It should be noted that when test devices are in-situ a manned support vessel will always be alongside, with a minimum of two personnel. Environmental observation will be recorded, including presence of marine mammals and bird activity.

The project location is on the eastern margin of Strangford Narrows which at that location is approximately 700 m wide. The associated mooring is not within a main navigation area and hence will not affect the operation of the Strangford – Portaferry ferry. Considering the width and local topography of the Lough, the moorings are unlikely to affect normal through passage by small boats. The EVOPOD device will be subject to an appropriate Crown Estate licence and consultations will be undertaken with MCA and Commissioners of Irish Lights in respect of necessary markers etc. In addition, local Sailing Clubs will be informed and consulted.

I trust the above and attached information is appropriate and please contact me directly should you require any additional detail.

Yours sincerely



Paul McArdle CEnv, MIEMA
Director

Encs

Figure 1. Ally Cat



Figure 2.1. Ally Cat Schematic

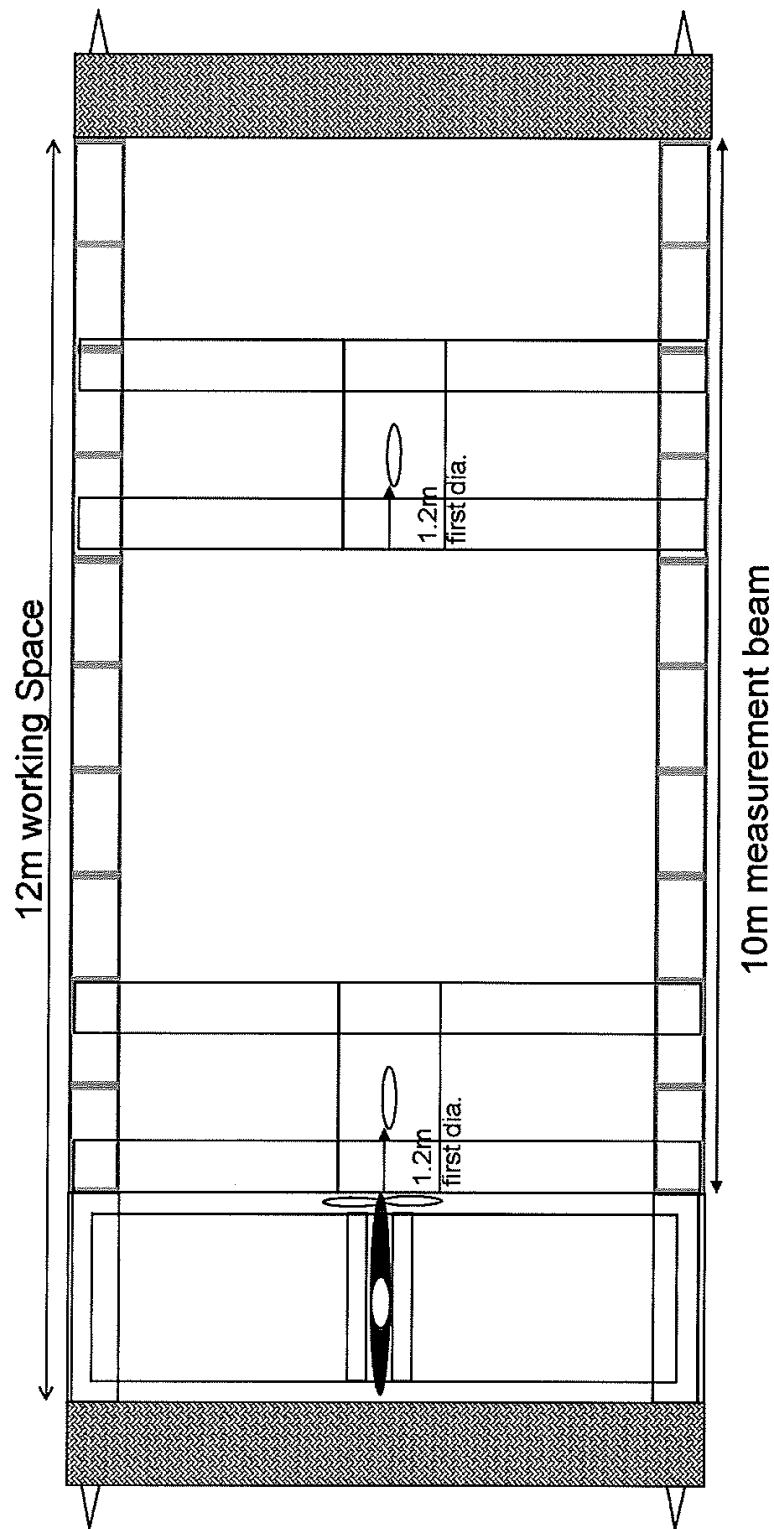


Figure 2.2. Ally Cat Schematic

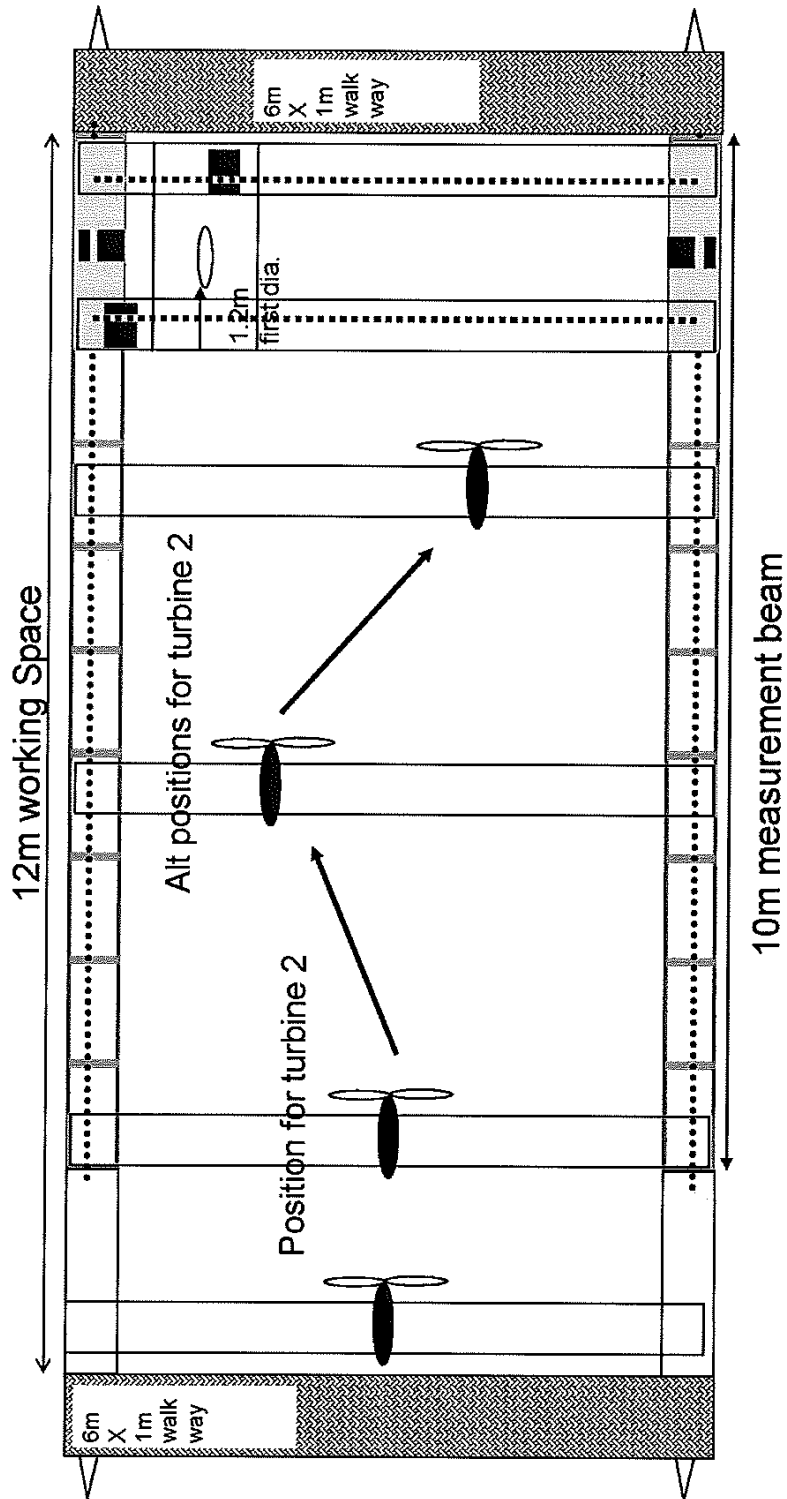


Figure 3. 1/10thScale Device Schematic

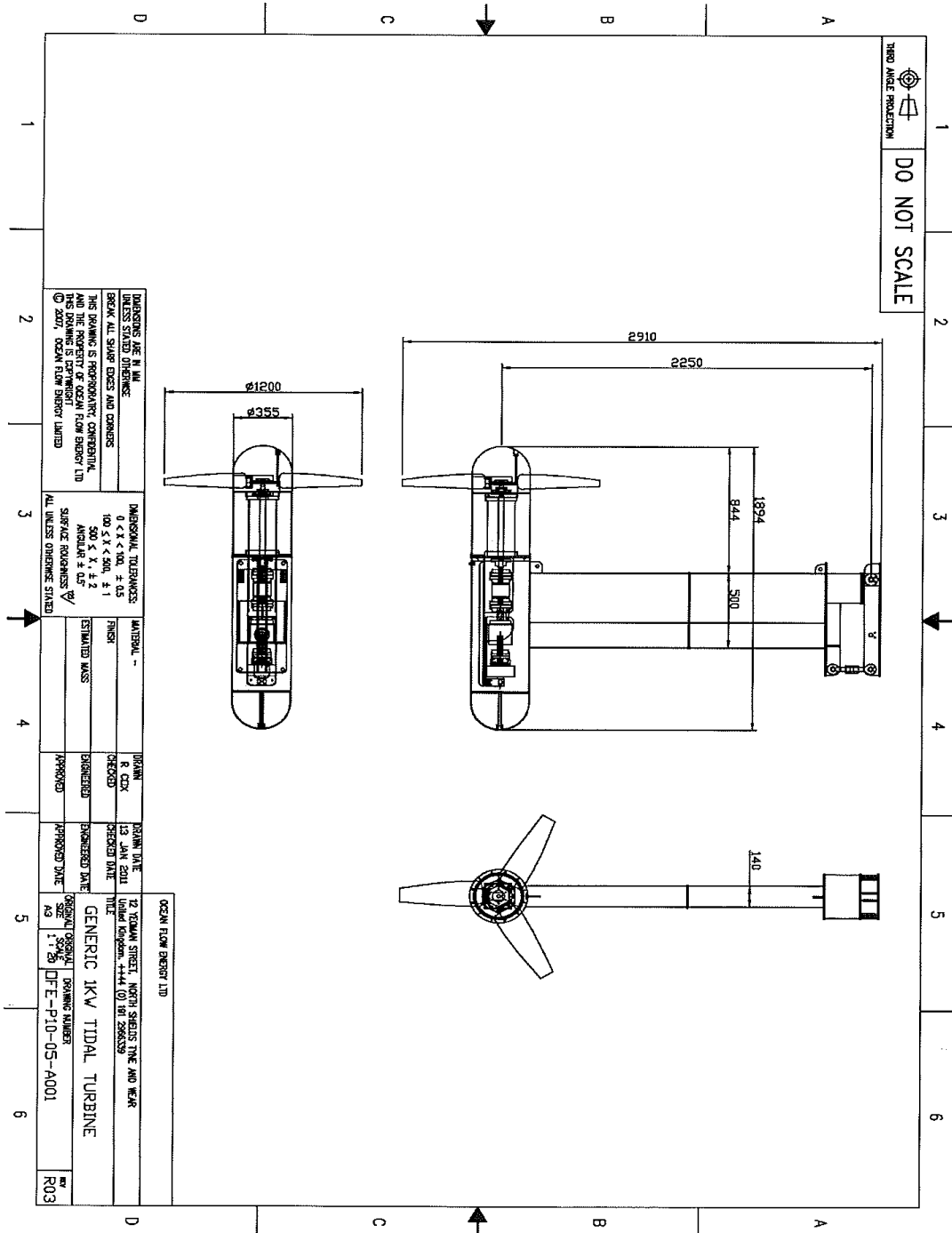
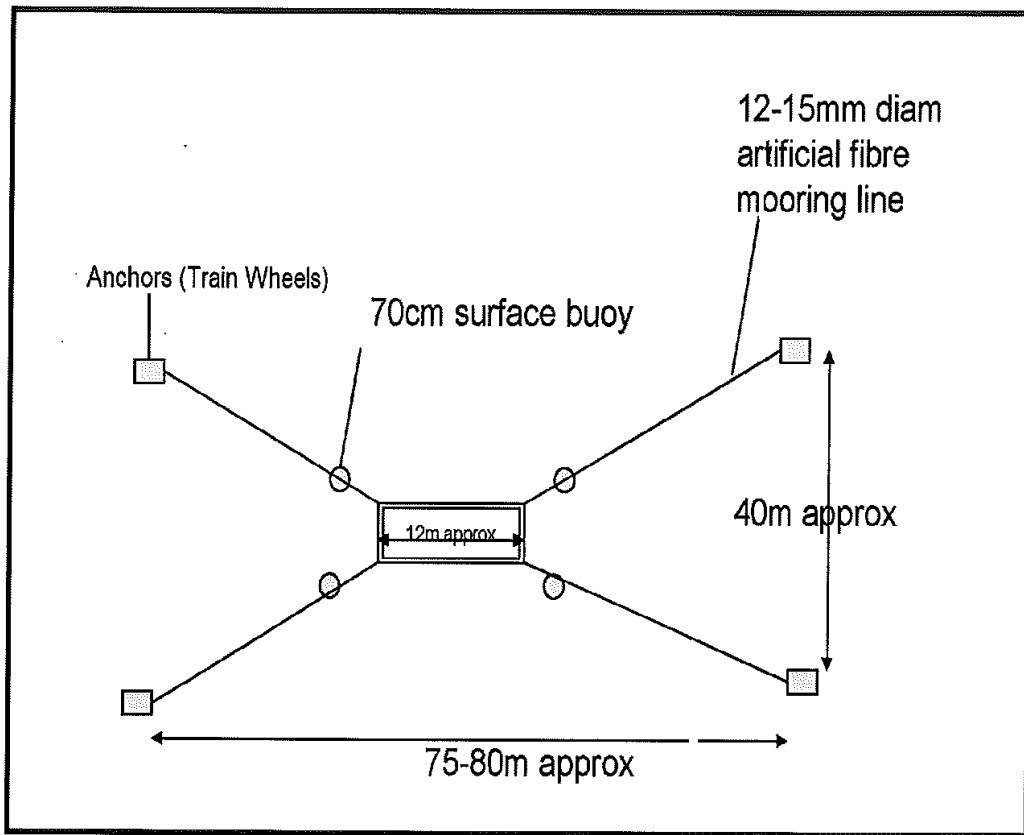


Figure 4. Mooring Design



Appendix 2

Mr Paul McArdle
MARENCO
Adelaide Business Centre
Apollo Road
Belfast
BT12 6TA

Direct Tel No: 028 92623156

08 March 2011

Dear Mr McArdle

QUB & Edinburgh University Tidal Turbines Scale Devices – Field Testing FEPA Licence Exemption Request.

Thank you for your letter and associated documentation of 1 March 2011 requesting an opinion on whether the Department considers the above project an exempt activity.

The Department has considered your proposal and would advise that it considers the project as exempt activity under the Deposits in the Sea (Exemptions) order (Northern Ireland) 1995.

The decision is twofold, the "Alley Cat" is essentially a floating vessel and as such under article 18 of the above order the deposit of temporary moorings are exempt activity. Secondly under article 22 of the order the deposit of any scientific instrument or associated equipment in connection with a scientific experiment or survey is exempt activity. The temporary deployment of the scientific test turbines on the vessel has therefore been deemed exempt also.

The Department would advise that these exemptions do not negate the responsibility of the sponsoring parties to gain any other leases or access/environmental permissions that may be required to progress the proposal. As such the Department will forward this letter and the details of the proposal to all its consultees for their information.

A list of the Departments consultees is provided below, you may wish to contact them directly for advice yourself.

The Department would advise that any amendment to the proposed project either in installation, operation methodology or location of the vessel be communicated to them at your earliest convenience to allow a reappraisal of the project.



Consultees

NIEA, Natural Heritage, Tel: 028 905695666
Maritime and Coastguard Agency, Tel: 028 91475305
The Crown Estate (NI Representatives, McConnell Chartered Surveyors), Tel:
028 90205900
Centre for Maritime Archaeology, Tel: 028 70323094
Department of Agriculture and Rural Development (Fisheries Division), Tel:
028 90765826
Agri Food and Biosciences Institute, Tel: 028 90255502
Department of Culture Arts and Leisure (Inland Fisheries), Tel: 028 90515122
ext 75122
Strangford Lough and Lecale Partnership, Tel: 028 42728886

Also attached is a copy of the Pollution Prevention Guidelines for information whilst the project is being undertaken. Please do not hesitate to contact the Department if you need any further clarification.

Yours sincerely



Chris Burns
NIEA, Marine Assessment and Licensing Team
17 Antrim Road
Lisburn
BT28 3AL

Enc PPG5