EMEC Fall of Warness Tidal Test Site Section 36 Application Environmental Statement December 2014

EMEC ORKNEY
THE EUROPEAN MARINE ENERGY CENTRE LTD

European Marine Energy Centre (EMEC) Fall of Warness Tidal Energy Test Site, Orkney

Application for Section 36 Consent under the Electricity Act 1989

ENVIRONMENTAL STATEMENT

December 2014

CONTENTS

Glossary of Abbreviations

COLREGS	The International Regulations for Preventing Collisions at Sea 1972
CPA	Coastal Protection Act 1949
DECC	Department of Energy and Climate Change
EA	Environmental Appraisal
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre Ltd
EPS	European Protected Species
ERP	Emergency Response Procedure
ES	Environmental Statement
EU	European Union
FEPA	Food and Environment Protection Act 1985
IMO	International Maritime Organisation
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MSFD	Marine Strategy Framework Directive
MS-LOT	Marine Scotland's Licensing Operations Team
NLB	Northern Lighthouse Board
OIC	Orkney Islands Council
PFOW	Pentland Firth and Orkney Waters
PMF	Priority Marine Features
RAMSAR	Ramsar convention site (Convention on Wetlands of International Importance)
SAC	Special Areas of Conservation
SEPA	Scottish Environment Protection Agency
SMWWC	Scottish Marine Wildlife Watching Code
SNH	Scottish Natural Heritage
SOP	Standard Operating Procedure
SPA	Special Protected Areas
SSMEI	Scottish Sustainable Marine Environment Initiative
SSSI	Site of Special Scientific Interest

1 INTRODUCTION

This Environmental Statement (ES), together with the accompanying Environmental appraisal (EA), Navigational Risk Assessment (NRA), constitutes the formal report of the Environmental Impact Assessment (EIA) undertaken in support of an application for consent under Section 36 of the Electricity Act 1989 (Section 36 consent) by the European Marine Energy Centre Ltd (EMEC) to operate a tidal energy test centre at the Fall of Warness, Orkney. The ES considers the potential impacts during installation, operation and eventual decommissioning of the project, and should be viewed in addition to, and as an extensive update to, the original EIA for the same site (see below).

1.1 Background

The EMEC grid-connected tidal energy test site at the Fall of Warness, Orkney, was established in 2005. In advance of its establishment, an EIA was undertaken to support EMEC's application for licences/consents to develop the site. The EIA process included the production of an ES (*Aurora 2005*) and NRA (*Anatec 2010*) for the site.

Although EMEC was granted the licences/consents necessary for establishing the test site infrastructure, individual developers wishing to test devices at the site are required to apply for and obtain any licences/consents necessary to install their devices. These licences/consents include a Marine Licence under Section 25 of the Marine (Scotland) Act 2010, appropriate licences to disturb European Protected Species Licence/basking shark and, for projects with a rated power output of >1MW, consent under Section 36 of the Electricity Act 1989. Amongst other things, this requires each individual developer to provide appropriate supporting information to assess the potential impact of deploying, operating and decommissioning their devices on key natural heritage features and navigational safety.

In 2013/14 a review of the environmental documentation and other data available for the Fall of Warness tidal energy test site was undertaken by Scottish Natural Heritage (SNH) to assist EMEC and the Regulator, Marine Scotland, in reviewing the environmental assessment required to inform the consenting process for the test site. This led to the undertaking of an Environmental Appraisal (*EMEC 2014*), the outputs of which can be used in pre-appraising potential projects at the test site using a 'project envelope' approach (see Section 1.4 below). This project envelope describes the types and characteristics of marine energy convertor systems likely to be deployed for testing at the Fall of Warness tidal test site. It also describes the types of marine operations and activities likely to be associated with the installation, operation and maintenance of these devices. Any proposal falling within this project envelope (as assessed by the Regulator) will be considered pre-appraised and will

not require any further environmental appraisal by Marine Scotland when determining any associated Marine Licence application.

As confidence in the consenting process at EMEC has grown and in order to streamline the consenting process further, EMEC is keen to establish a single site-wide Section 36 consent to apply to the Fall of Warness tidal energy test site as a whole site. Under this proposal, EMEC will be granted generic site-wide Section 36 consent to generate electricity up to a maximum total output of 10MW from the site. Individual developers will still be required to apply for and obtain their own project-specific Marine Licence and any other applicable project-specific licences and permissions, in order to deploy devices at the test site.

The primary driver for this application is one of efficiency, related to the wish to minimise repeated and unnecessary calls on Regulators' and Stakeholders' time and effort. With developers now beginning to test second generation machines, there is now a high risk that multiple developers will wish to test devices with nominal rating above the current exemption level of 1MW. If this were to occur, then there would foreseeably be several Section 36 consent applications progressing in parallel, with most of the documentation being the common to all applications.

The proposal that EMEC hold a site-wide Section 36 consent enables the collective risks of site activity from a range of typical devices to be addressed once, in this single application, with stakeholder input thereafter being directed at the project-specific Marine Licence applications.

1.2 The European Marine Energy Centre Ltd

Established in 2003, EMEC is the first and only centre of its kind in the world, providing developers of both wave and tidal energy systems with purpose-built, United Kingdom Accreditation Service accredited open-sea testing facilities.

Orkney, with its excellent oceanic wave regime, strong tidal currents, grid connection and sheltered harbour facilities, is an ideal base for EMEC. Orkney also boasts significant renewable, maritime and environmental expertise within its local community, all of which play a key role in supporting activities at EMEC.

With 14 full-scale test berths (8 tidal energy and 6 wave energy) across two sites, there have been more grid-connected marine energy devices deployed at EMEC than at any other single site in the world. Developers are attracted from around the globe to use the facilities to prove what is achievable in some of the harshest marine environments, whilst in close proximity to Orkney's sheltered harbours. EMEC also operates two non-grid-connected test sites where developers can test smaller scale

devices, or those at an earlier stage in their development, gaining real sea experience in less challenging conditions than those experienced at the grid-connected wave and tidal test sites.

Beyond device testing, EMEC provides independently-verified performance assessments and a wide range of consultancy and research services, as well as providing consenting support to developer clients.

1.3 The EMEC Fall of Warness Tidal Test Site

EMEC's grid-connected tidal energy test site is located at the Fall of Warness, just west of the island of Eday in the Orkney Islands. The site sits in a narrow channel between the Westray Firth and Stronsay Firth where tidal flow accelerates as water flows through the inter-island constriction on its way from the North Atlantic Ocean to the North Sea. The site was chosen for its high velocity marine currents which can reach almost 4m/sec (7.8 knots) at spring tides. The location of the EMEC tidal energy test site is shown in Figure 1 below.

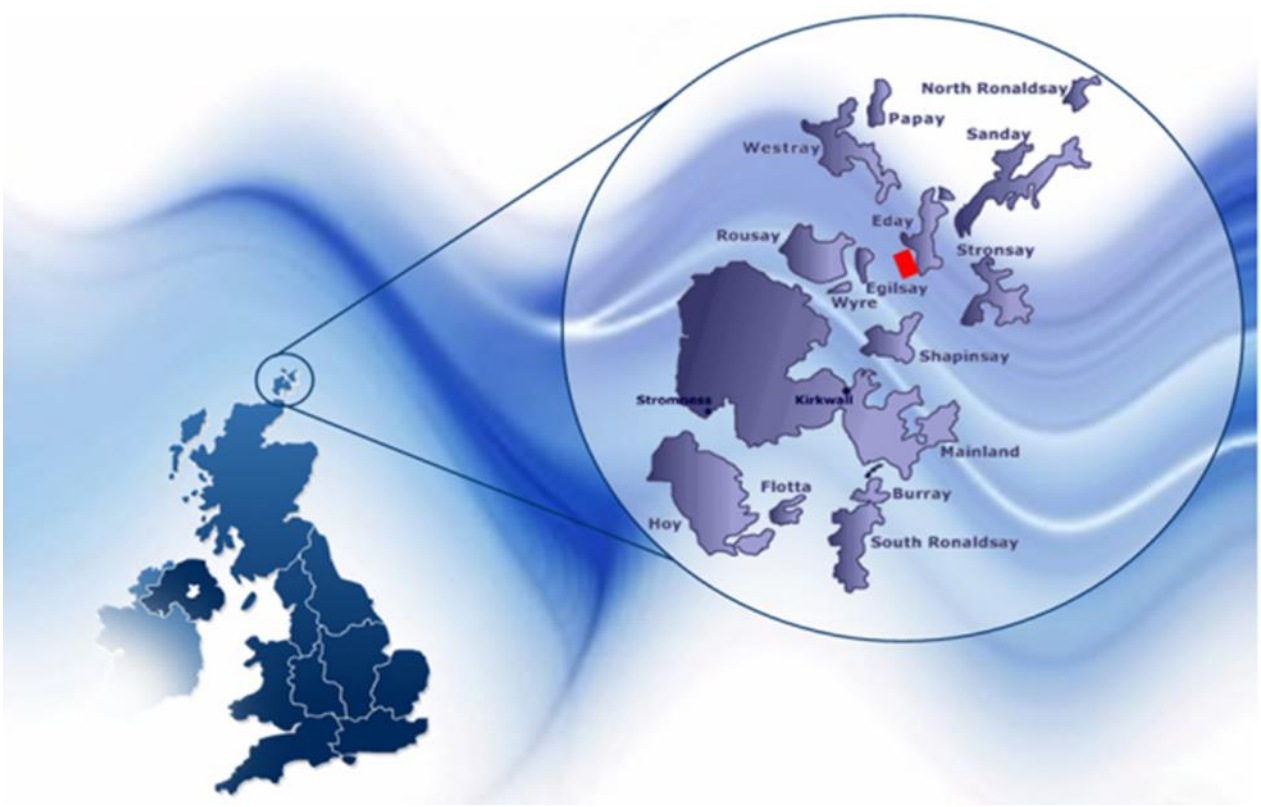

Figure 1: Location of the EMEC tidal energy test site (red box)

The test site currently provides eight tidal test berths at depths ranging from 12m to 50m in an area 2km across and approximately 4km in length (see Figure 2 below). The 11kV sub-sea cables extend to the middle of the tidal stream from an electricity substation on the island of Eday which houses the main switchgear, backup generator and communications room. The substation controls the supply from each tidal device and includes connection to the National Grid. An adjacent laydown area provides developers with space to place their power conditioning equipment, required to convert electricity from the level at which it is generated to grid-compliant electricity. EMEC sells generated electricity on behalf of the developers, who receive a return. In addition to transporting electricity, the sub-sea cables also contain a fibre-optic core which allows developers to communicate with their devices and transmit data back to the EMEC data centre and office facilities in Stromness.

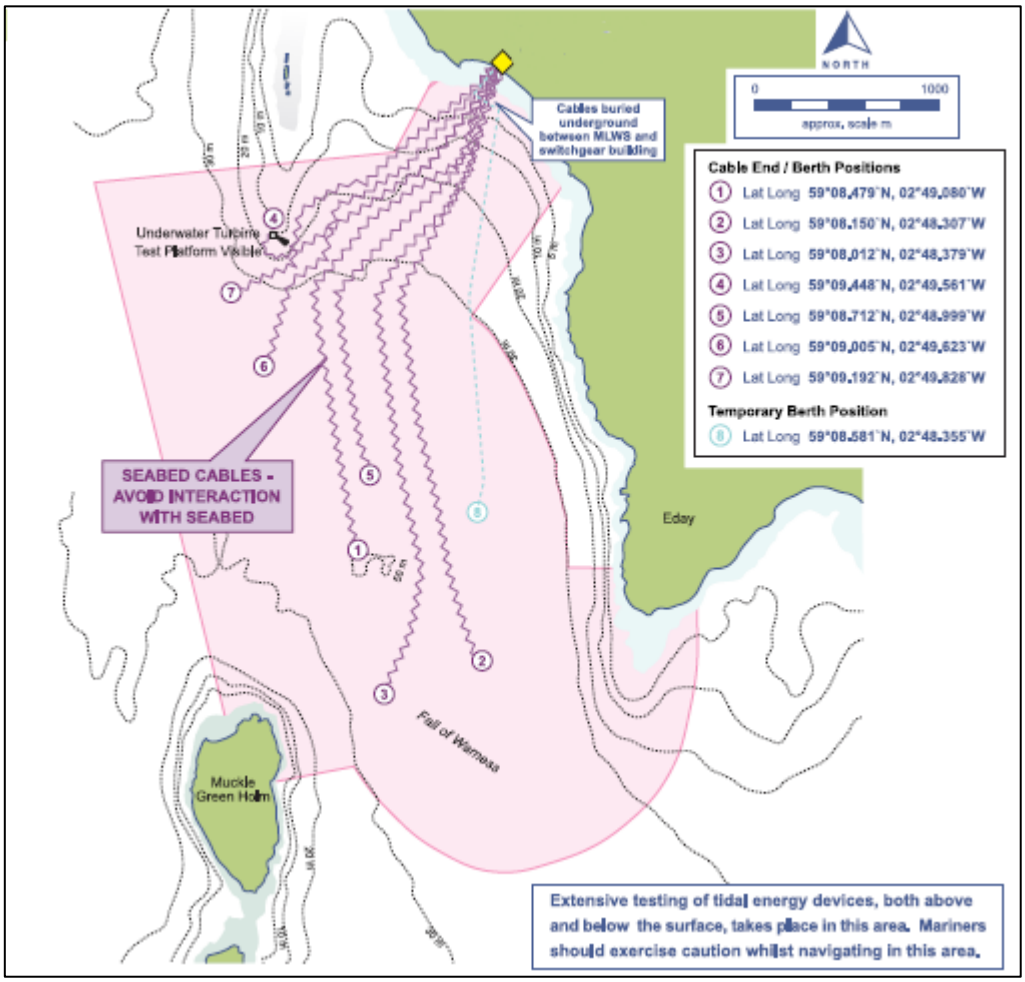

Figure 2: EMEC Fall of Warness tidal test site infrastructure

EMEC leases the area of seabed relating to the Fall of Warness tidal test site from The Crown Estate. The original proposal that had been agreed with The Crown Estate, and that was assessed during the EIA, was for a larger test site lease area.

However, following detailed discussions with local fisheries organisations, and particularly in recognition of fishing activity in shallower coastal waters adjacent to the Eday coastline, EMEC opted to reduce the extent of the test site lease area, leading to its current boundaries as shown in Figure 2. The current boundary coordinates of the EMEC test site at Fall of Warness are shown in Table 1 below.

Coordinates of EMEC Tidal Test Site, Fall of Warness, Orkney Islands.
Points along site boundary:
59° 09. 780'N 02° 47. 890'W
59° 09. 250'N 02° 48. 400'W
59° 08. 360'N 02° 47. 760'W
59° 08. 370'N 02° 47. 440'W
59° 08. 370'N 02° 47. 010'W
59° 07. 600'N 02° 47. 570'W
59° 07. 860'N 02° 49. 110'W
59° 07. 820'N 02° 49. 500'W
59° 07. 910'N 02° 49. 830'W
59° 09. 590'N 02° 50. 800'W
59° 09. 740'N 02° 48. 840'W
59° 10. 010'N 02° 48. 550'W

Table 1: EMEC Fall of Warness tidal test site boundary coordinates

1.4 The Project Envelope

In 2013/14, EMEC produced a summary of the types and characteristics of tidal energy converter devices likely to be deployed for testing at the Fall of Warness test site. This summary was used as the basis for developing a 'project envelope' against which the potential environmental impacts of installation, operation and maintenance of devices under test could be appraised by the Regulator.

The project envelope is based on detailed knowledge of parameters relating to devices that have been deployed at EMEC, together with those emerging elsewhere in the UK. The project envelope therefore reflects the anticipated range of devices, and features thereof, and is an expression of the maximum anticipated likely usage of the site. In this context, it represents an expression of the cumulative presence of device features anticipated at the site, and therefore is a good basis for the assessment of cumulative environmental risk. Consequently, the environmental appraisal undertaken for the site is valid for all activities described in the project envelope, to the agreed levels described in the envelope.

Where a developer's project fits within the project envelope, no further environmental appraisal by Marine Scotland will be required in determining a Marine Licence application. Any proposals for deploying devices at the test site which are deemed by Marine Scotland to be out-with the project envelope will require further consultation and assessment/appraisal.

The project envelope for the Fall of Warness test site includes the following activities:

- Installation of new sub-sea cable and associated cable protection systems (mattresses, armour) where required and potential recovery and replacement on the seabed of existing cabling from berths to shore, and repair/maintenance to existing cables or cable protection systems.
- A maximum of 9 berths, accommodating up to 12 tidal energy devices at any one time, thereby supporting the testing of small arrays or additional non-grid-connected devices.
- Deployment of scientific instrumentation and associated cabling.
- Testing of buoys (maximum of two simultaneous tests).
- Testing of mooring arrangements (e.g. tripod support structures) or individual stand-alone components of devices.
- Potential for simultaneous operations, i.e. installation or maintenance activities, at more than one berth at the same time.

The following activities are ***not*** covered by the project envelope and would require further consultation and assessment/appraisal:

- Seabed preparation (e.g. seaweed clearance, rock grinding/blasting)
- Geotechnical and geophysical surveys (these are considered and, where necessary, licensed through the Notification of Site Survey procedures).
- Use of acoustic deterrent devices.
- Deployment and operational activities outside the parameters defined in this document.

Devices included in the project envelope may feature the following blade/rotor designs:

- Blades with exposed tips (may include multiple rotors, on single or multiple axles)
- Blades with enclosed tips (may include multiple rotors, on single or multiple axles), including 'annular' and 'venturi' style devices.
- Blades with contra-rotating mechanism (may include multiple rotors, on single or multiple axles)
- Single or multiple Archimedes rotors

Examples of technologies within the project envelope typically deployed for testing at the EMEC site are described below.

Venturi Effect

Figure 3 below illustrates this type of device. Venturi effect devices house the turbine within a duct which concentrates the tidal flow passing through the turbine. The funnel-like collecting device sits submerged in the tidal current. The flow of water can drive a turbine directly or the induced pressure differential in the system can drive an air-turbine. Figure 7(a) below shows an example of a partial device that uses a small venturi effect installed at EMEC.

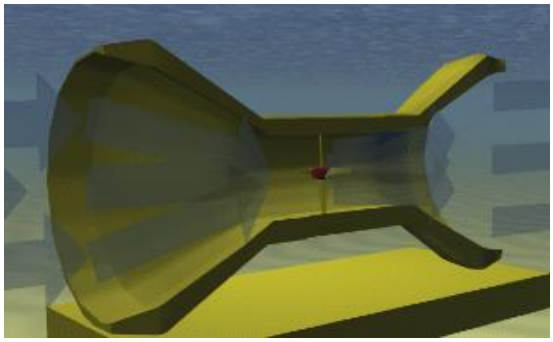

Figure 3: Illustration of venturi effect technology.

Horizontal Axis Turbine

This is the most common technology deployed at the test site to date, consisting of a two or three-bladed turbine, fixed to the seabed in some way. A graphic illustration of such a device is illustrated in Figure 4 below. Horizontal axis turbines (HAT) extract energy from moving water in much the same way as wind turbines extract energy from moving air. The tidal stream causes the rotors to rotate around the horizontal axis and generate power.

A HAT can be located at the right point in the water column by sitting on the seabed, or being attached to one or more piles that are embedded in the seabed. Horizontal axis turbines can also be deployed by 'suspending' them from a floating platform device. Figure 7 (b) – (f) shows examples of horizontal axis devices deployed at EMEC.

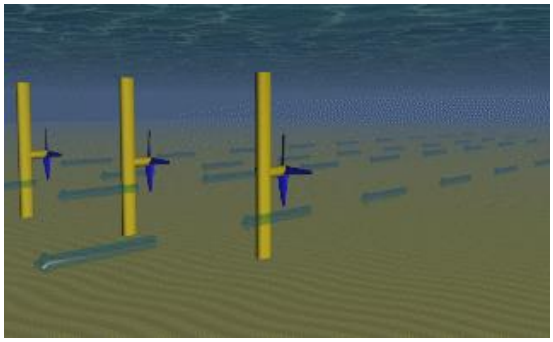

Figure 4: Illustration of horizontal axis technology.

Vertical Axis Turbine

Vertical axis turbines extract energy from the tides in a similar manner to that for horizontal axis turbines, however in this case the turbine is mounted on a vertical axis. The tidal stream causes the rotors to rotate around the vertical axis and generate power. Vertical axis turbines are illustrated in Figure 5 below.

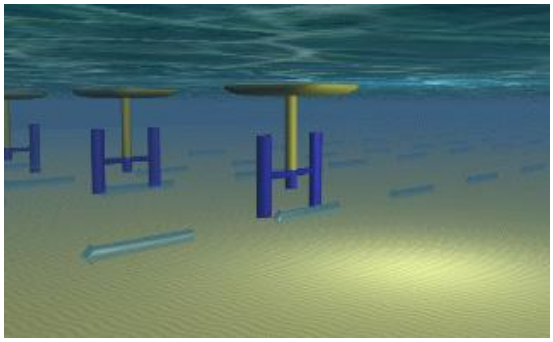

Figure 5: Illustration of vertical axis technology.

Archimedes Rotors

The Archimedes Rotor is a helical corkscrew-shaped device (a helical surface surrounding a central cylindrical shaft). The device draws power from the tidal stream as the water moves up/through the spiral turning the turbines. Figure 6 below illustrates a typical Archimedes rotor type device.

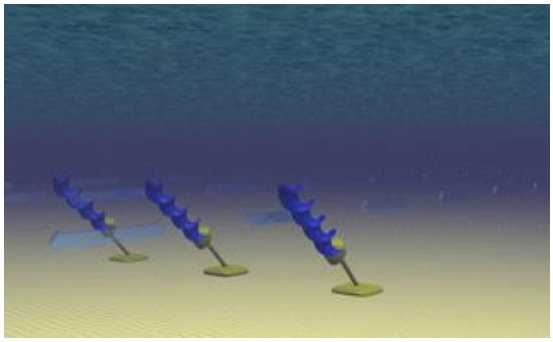

Figure 6: Illustration of Archimedes rotor technology.

To date, a wide variety of devices incorporating some of the technologies described above have been deployed for testing at the EMEC site at Fall of Warness, as can be seen in Figure 7 below.

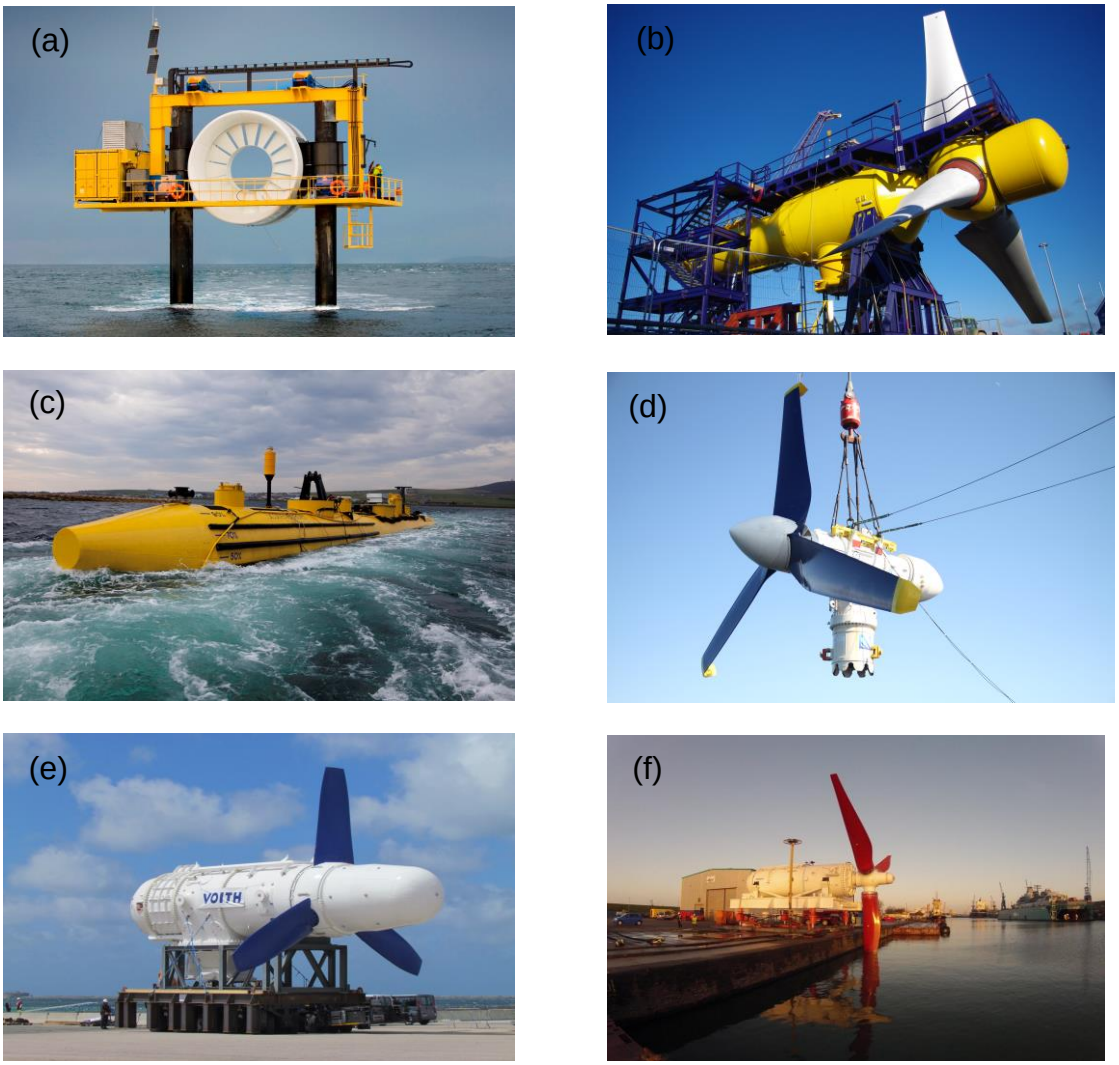

Figure 7: Devices deployed at the EMEC Fall of Warness tidal test site to date. (a) Open Hydro open-centred turbine; (b) TGL 1MW HAT; (c) Scotrenewables SR250 twin-rotor floating HAT; (d) Atlantic Resource Corp. 1MW HAT; (e) Voith Hydro Hytide 1MW HAT; (f) Andritz Hydro Hammerfest HS1000 HAT.

EMEC does not generally provide mooring or foundation infrastructure at its grid-connected test site. Devices deployed at the site are generally installed utilising developers' own custom-made foundation/moorings. The following mooring methods are included within the project envelope:

- Mono/twin-pile(s) fixed into the seabed (non-percussive drilling only)
- Tripod structure, pinned to the seabed (non-percussive drilling only)
- Tripod structure held on seabed by gravity
- Other mooring structure pinned to (non-percussive drilling only) or held on the seabed by gravity
- Gravity-based anchor(s) with mooring line(s) attached
- Embedment anchor(s) with mooring lines attached

Full device details including design, structure, materials and weights, and any device-specific mooring arrangement and foundation materials will be specified by the developer in the project-specific supporting documentation submitted to Marine Scotland as part of the Marine Licence application documentation.

In addition to the features of different devices described above, the project envelope also describes a range of marine works associated with the installation, operation and maintenance of these devices. It describes the range of different types of vessels and activities that are typically used throughout the whole testing lifecycle of deployments at the test site.

Full details of the project envelope for the Fall of Warness test site are provided in Annex 1 of *EMEC 2014*.

1.5 Document Purpose

This ES has been produced to inform and support an application by EMEC for Section 36 consent for testing devices at its grid-connected tidal energy test site at Fall of Warness.

The Section 36 consent application which this ES supports does not relate to a new project, but is a proposed change to the existing licensing arrangement for developers wishing to test their technology devices at the existing EMEC Fall of Warness test site that has been operating since its creation in 2005. This application is driven by a wish to reduce the potential for multiple Section 36 consent applications being submitted concurrently (or in close succession) for the same site, with the recognition that levels of electricity generation from individual devices at levels above 1MW are to be expected at this stage of development of the marine energy sector.

As the EMEC test site at Fall of Warness is an established site, no scoping study was undertaken for this Section 36 consent application. EMEC has discussed the main issues pertinent to the application in detail with key stakeholders, including MS-LOT, SNH, MCA, NLB and OIC, and these are addressed in the NRA (*Aurora 2005*) and EA (*EMEC 2014*) which accompany this document. EMEC has also informed all other consultees of its intention to progress with this Section 36 consent application, and has explained the underlying 'business as usual' context.

The purpose of this document is to support the Section 36 consent application by presenting environmental and other information to inform the relevant authorities, statutory consultees, and other key stakeholders. Full details of the scoping exercise undertaken for establishing the test site can be found in Section 5 of *Aurora 2005*.

This ES makes reference to and should be read in conjunction with the following key documents:

1. **EMEC Tidal Test Facility Fall of Warness Environmental Statement: June 2005 (Aurora 2005).** This document was produced in June 2005 to report the findings of the EIA carried out for establishing the EMEC test site at Fall of Warness.
2. **EMEC Fall of Warness Navigational Risk Assessment: May 2010 (Anatec 2010).** This document reports the findings of an NRA initially carried out in May 2005 to support the establishment of the EMEC test site at Fall of Warness. This NRA was updated in November 2010 to take into account the latest vessel activity data and guidance/experience available since the original NRA. On the advice of MCA, vessel traffic surveys are carried out every two years in order to confirm no substantial change to vessel usage of the site. If substantial change is detected then the whole NRA will be updated.
3. **EMEC Fall of Warness Test Site Environmental Appraisal: August 2014 (EMEC 2014).** This document provides a detailed environmental appraisal of potential impacts on key receptors at the test site.

All of the above documents are included in the application pack which accompanies this ES. The environmental appraisal document (*EMEC 2014*) contains detailed impact assessments relevant to the receptors discussed in Section 11 of this ES.

2 PLANNING POLICIES, GUIDANCE AND AGREEMENTS

This section provides an overview of the planning policy, guidance, leasing requirements and legislation which have a bearing on or relationship with aspects of this project.

2.1 Terrestrial Planning

All onshore works above Mean Low Water Springs (MLWS) are subject to Scotland and Orkney planning regulations and guidance. EMEC was granted planning permission for the permanent and temporary onshore components of the Fall of Warness tidal energy test site, under Section 57 of the Town and Country Planning (Scotland) Act 1997, in April 2005.

Discussions with Orkney Islands Council Planning department regarding additional storage facilities required onshore by developers to store equipment have been progressed as required, and the necessary permissions granted (OIC planning decisions 10/457/PP, October 2010, and 12/558/PP, September 2012).

2.2 Marine Planning

In recent years there has been increasing international focus on the concept of marine conservation and marine spatial planning. The key European Union (EU) legislation is the EU Marine Strategy Framework Directive (MSFD) which was passed in June 2008.

2.2.1 National Regulations

The main UK regulations put in place to deliver the MSFD are the UK Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010. Both pieces of legislation put in place frameworks for planning within the marine environment. In addition to the development of a more streamlined consenting process for marine projects (see Section 2.4 below), the Act includes measures for marine planning and marine conservation.

2.2.2 Regional Policy

Currently, neither regional marine spatial planning bodies nor any regional marine spatial plans exist for Scotland. There have been four pilot marine spatial planning activities under the Scottish Sustainable Marine Environment Initiative (SSMEI).

One of these pilot schemes is the Pentland Firth and Orkney Waters (PFOW) Marine Spatial Plan Framework and Regional Locational Guidance for Marine Renewable Energy which was published in June 2009. This provides a route map which sets out the process Marine Scotland will follow to build a non-statutory interim Marine Spatial Plan for the PFOW.

2.3 Seabed Lease

A seabed lease must be obtained from The Crown Estate before any development is installed on the seabed. In 2007, EMEC was awarded a seabed lease from The Crown Estate to establish and operate a tidal energy test site at the Fall of Warness for a period of 15 years.

2.4 Consents and Licensing

The following licenses and consents are required in order to construct and operate an offshore marine energy generating station in Scotland:

- Consent under Section 36 of the Electricity Act 1989 with deemed permission under Section 57 OR separate permission under Section 28 of the Town and Country Planning (Scotland) Act 1997 (for any associated onshore developments).
- Marine Licence under Section 25 of the Marine (Scotland) Act 2010.
- Permission under Section 20 of the Water Environment and Water Services (Scotland) Act 2003 (if development is within 3 nm of the coast or inland waters and involves activities controlled under this act) (see Section 2.4.3 below).
- In certain cases a licence to disturb European Protected Species (EPS) and/or a licence to disturb basking shark under The Conservation (Natural Habitats, & c.) Regulations 1994 may also be required.

Additionally, applicants seeking permission to construct and operate a marine energy generating station in Scotland must:

- Submit an ES as required by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000;
- Provide sufficient information to enable an Appropriate Assessment, if one is required, to be undertaken by the Competent Authority under The Conservation (Natural Habitats, & c.) Regulations 1994; and

- Submit a Decommissioning Programme to the Department of Energy and Climate change (DECC) as required under the Energy Act 2004.

The applicable legislation to the licenses and consents required for the operation of a tidal energy test site at the Fall of Warness which are the subject of this ES, are discussed in further detail below.

2.4.1 Section 36 Electricity Act 1989

Section 36 of the Electricity Act 1989 requires consent from Scottish Ministers to construct, extend or operate an onshore electricity generating station exceeding (or, when extended, will exceed) 50 MW. Consent under Section 36 of the Electricity Act 1989 is also required for development of offshore generating stations over 50 MW in the Scottish Renewable Energy Zone (REZ) and over 1 MW within Scottish territorial waters.

Marine Scotland's Licensing Operations Team (MS-LOT) is responsible for issuing consent for renewable energy projects under Section 36 of the Electricity Act 1989.

As a tidal energy electricity generating station within 12 nautical miles (nm) of land and a potential capacity of over 1 MW, the EMEC tidal energy test site will require consent from Scottish Ministers under Section 36 of the Electricity Act 1989.

2.4.2 Marine Licence

The Marine Licence came into force on 6th April 2011 under the Marine (Scotland) Act 2010. The Marine Licence replaced the licences previously required under Food and Environment Protection Act 1985 (FEPA) and Coastal Protection Act 1949 (CPA).

MS-LOT is responsible, under the Marine (Scotland) Act 2010 and Part 4 of the UK Marine and Coastal Access Act 2009, for issuing a Marine Licence. A Marine Licence is required for any of the following activities:

- Deposit of any substance or object in the sea or on or under the seabed.
- Construction, alteration, or improvement of works on or over the sea or on or under the seabed.
- Removal of substances or objects from the seabed.
- Dredging.
- Deposit of and/or use of explosives.
- Incineration of substances or objects.

A Marine Licence is therefore necessary for the installation (and removal) of foundations, moorings, devices and associated infrastructure necessary for the deployment and testing of tidal energy converter devices at the EMEC Fall of Warness test site.

2.4.3 Water Environment and Water Services (Scotland) Act 2003

Section 20 of the Water Environment and Water Services (Scotland) Act 2003 and the associated Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR Regulations) apply to a development within 3 nm of the highest tide mark. These regulations apply to any activity that:

- Requires abstraction of coastal waters greater than 10 m^3 per day.
- Requires point source discharges to coastal waters greater than 0 m^3 per day.

Engineering works in coastal and transitional waters are not normally regulated by the Scottish Environment Protection Agency (SEPA) under CAR. These works will be regulated by Marine Scotland under Marine (Scotland) Act (2010).

The operation of the EMEC tidal test site at the Fall of Warness (and the Section 36 consent being applied for) does not require any considerations under CAR.

2.4.4 Environmental Impact Assessment Regulations

European requirements on Environmental Impact Assessment (Council Directive 85/337/EEC as amended by Council Directive 97/11/EEC) are applied for the Electricity Act regime through the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('the regulations').

Under the regulations a Section 36-applicable development that is likely to have significant effect on the environment must be subject to EIA and an ES submitted along with the Section 36 consent application.

2.4.5 The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007

The European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) are transposed into Scottish law by the Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007. European sites protected under this legislation include

Special Protected Areas (SPA), Special Areas of Conservation (SAC) and Ramsar Convention sites (RAMSAR). Under this legislation, a Competent Authority must make an Appropriate Assessment of the implications for the site in view of that site's conservation objectives, before deciding to undertake or give any consent, permission or other authorisation for, a plan or project which:

- Is likely to have a significant effect on a European site in the UK (either alone or in combination with other plans or projects);
- Is not directly connected with or necessary to the management of the site.

The need for Appropriate Assessment extends to plans or projects out-with the boundary of the site in order to determine their implications for the interests protected within the site. Competent Authorities need to identify the qualifying interests and the conservation objectives for each European site involved in an Appropriate Assessment. There are a number of SPA and SAC sites in proximity to the EMEC tidal energy test site which have been considered during the EIA.

For any European Protected Species (EPS), Regulation 39 of the Conservation (Natural Habitats, &c.) Regulations 1994, makes it an offence to deliberately or recklessly capture, kill, injure, harass or disturb any such animal. It is also an offence to deliberately or recklessly obstruct access to a breeding site or resting place of any such animal, or otherwise to deny the animal use of the breeding site or resting place. In addition, it is an offence to disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs. For cetaceans (dolphins, porpoises and whales) only, there is a more general offence, namely deliberately or recklessly to disturb these creatures. The damage or destruction of a breeding site or resting place of any EPS is an offence of strict liability. A licence to disturb EPS is therefore required for any activity that might potentially result in disturbance to EPS.

MS-LOT is responsible, under the Marine (Scotland) Act 2010 and regulation 44(2)(e) of the Conservation (Natural Habitats, &c.) Regulations, for issuing licences to disturb EPS within areas of marine renewable energy development.

2.4.6 The Wildlife and Countryside Act 1981 (as amended)

Basking sharks are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are protected against intentional or reckless disturbance or harassment. A licence to disturb basking shark is therefore required for any activity that might result in disturbance to basking sharks.

MS-LOT is responsible, under the Marine (Scotland) Act and regulation 16(3) (i) of the Wildlife and Countryside Act 1981 (as amended), for issuing licences to disturb basking sharks within areas of marine renewable energy development.

2.4.7 Energy Act 2004

Responsibilities for the decommissioning of marine renewable energy generating stations have not been devolved to the Scottish Government and therefore licensing requirements for decommissioning lie with the Department of Energy and Climate Change (DECC) through Section 105-114 of the Energy Act 2004 (Decommissioning Programme).

EMEC will produce a decommissioning programme (DP) for the decommissioning of the test site infrastructure only. This DP will be produced to the standards of DECC Guidance Notes: Decommissioning of Offshore Renewable Energy Installations Under the Energy Act 2004 and will consider the latest technological developments, legislation and environmental requirements at the time that the work is due to be carried out.

Responsibility for decommissioning of marine renewable energy generation devices, foundations and other project-specific infrastructure lies with each individual developer. This is currently enforced through specific clauses in the EMEC-Developer contractual berth agreement for hire of the test berth, and conditions on developers' Marine Licences.

3 ECONOMIC BENEFITS

EMEC is the only accredited, grid-connected, test centre for wave and tidal marine renewable energy in the world currently suitable for testing 14 full-scale devices simultaneously. The test centre was established with approximately £36 million of funding from the Scottish Government, Highlands and Islands Enterprise, the Carbon Trust, the UK Government, Scottish Enterprise, the European Union and Orkney Islands Council. EMEC currently has 27 full-time employees: this number has doubled since 2009.

To date, more marine energy devices have been tested at EMEC than any other single test site in the world. At an international level, EMEC is forging alliances with countries around the world including Canada, China, Japan, Singapore, South Korea, Taiwan and the USA, and is at the forefront in the development of international standards for marine renewable energy.

3.1 Local Benefits

Installation, maintenance and decommissioning activities associated with the EMEC test sites make use of the local supply chain where possible and appropriate. EMEC thus contributes to the local economy and plays a key role in job creation. Approximately 300 people are currently employed in Orkney within the marine renewables sector, in around 40 different local companies.

Local businesses benefit from increased local spend (e.g. accommodation, restaurants, shops, transport operators), particularly during the installation phase of developers' projects, but continuing through operation and eventually to decommissioning. It is estimated that wave and tidal developers testing at EMEC spend around £1million per device in the local economy. EMEC's total local spend to the end of 2013 was £7.7 million (46% of all EMEC spend 2005 - 2013).

£23 million has been invested by Orkney Islands Council and Highlands and Islands Enterprise in supporting infrastructure for the marine renewable energy sector in Orkney.

3.2 National Benefits

The establishment and operation of the EMEC test facility at Fall of Warness represents a major stepping stone in the advancement of the tidal energy industry, which has significant potential socioeconomic benefits for Scotland and the UK.

4 SITE SELECTION AND ALTERNATIVES

The Environmental Impact Assessment Regulations 1999 requires an outline of the main alternatives considered by a developer and an indication of the main reasons for the choice of site, taking into account the environmental effects.

When EMEC was formed in 2004, Highlands and Islands Enterprise (HIE) commissioned a study to determine the optimum site for a tidal test centre. A preliminary desktop study identified the following eight potential sites for initial screening:

- Yell Sound, Shetland Isles
- Blue Mull Sound, Shetland Isles
- Fall of Warness, Orkney Isles
- Pentland Firth
- Sound of Harris, Western Isles
- Sound of Barra, Western Isles
- The Sound of Islay (between Islay & Jura)
- Kyle Rhea, Skye

The three most favourable sites of the eight listed above, selected primarily on physical resource and distance from EMEC, were (ranked in order of preference):

1. Fall of Warness, Orkney
2. Yell Sound, Shetland
3. Pentland Firth, Orkney

Discussions with potential developers highlighted reservations about the Pentland Firth as a tidal test site due to relatively high wave exposure. The relatively long distance of Yell Sound from the existing location of EMEC was seen as a problem. The Fall of Warness was therefore selected as the most suitable option for establishing the tidal test site.

Full details of the site selection process, including selection of the location of the onshore electricity sub-station, can be found in Section 2 of *Aurora 2005.*

The EMEC tidal test site at Fall of Warness has been established and operating for over ten years and this ES does not propose to introduce any new activities at the site, and therefore no further assessment of alternatives is required.

5 BASELINE ASSESSMENT DATA

5.1 Site Characteristics and Key Sensitivities

As previously mentioned, an ES for establishing the Fall of Warness test site was produced in June 2005 (*Aurora 2005*). The aim of this ES and its supporting studies was to identify the environmental receptors that might be sensitive to the construction and installation of the proposed test site infrastructure, and to suggest management controls and mitigation measures to reduce any impacts to a tolerable level. Where this was not possible further study areas were identified.

Various preliminary studies were carried out to inform this ES, including terrestrial habitat and vegetation survey, coastal habitats survey, coastal and seabed processes review, seabed surveys, assessment of birds, cetaceans, sea mammals & coastal wildlife, and assessment of otter populations. Archaeological, visual & landscape, and navigational risk assessments were also undertaken.

The primary recommendation for further study which arose from the Regulator's consideration of *Aurora 2005* was for a land-based visual surface wildlife observations programme to be undertaken. This programme commenced in July 2005. In addition, SNH identified key site sensitivities to aid developers in addressing potential interactions between devices under test and species found within the receiving environment at the test site. The main sensitivities identified at the test site are harbour seals, which haul out and pup on rocks to the north of the site; European Protected Species such as cetaceans and otters; basking sharks; and diving birds.

The recent environmental documentation review undertaken by SNH in 2013/14 resulted in the development of a suite of species-specific environmental appraisals (*EMEC 2014*) to facilitate the consenting process by informing licence applications for the deployment of tidal devices for testing at the Fall of Warness test site.

5.2 Environmental Monitoring

In order to further characterise and provide baseline environmental data for the site, EMEC has undertaken a variety of environmental monitoring projects at the Fall of Warness test site. The principal objective of this environmental monitoring is to provide a targeted benefit to developers through provision of supporting data thus reducing the monitoring obligations placed on them individually, and reducing the inefficiencies associated with multiple data gathering initiatives all aimed at the same goal.

The results of these site-wide environmental monitoring projects can aid the Regulator and its statutory advisors to gain a more comprehensive understanding of the environmental sensitivities of the sites. This information can also be used to undertake environmental appraisals and to inform recommendations for specific monitoring requirements that form part of individual developers' device-specific monitoring plans.

A site-wide Section 36 consent will enable the Regulator to form a view on the appropriateness of encouraging a site-wide approach to environmental monitoring that would build on the lessons already learnt from the data gathered to date.

The following environmental monitoring projects have been undertaken by EMEC at the Fall of Warness test site:

- Land-based visual observations of surface wildlife
- Acoustic characterisation of underwater ambient noise
- Integrated environmental monitoring project:
    - Active Acoustic - utilising a custom-made sonar system
    - Passive Acoustic - using both drifting hydrophones and fixed hydrophones
    - Physical Environment - real-time long-term measurement of wave and tidal resource and conductivity, temperature, depth, and turbidity (CTD/Tu) of sea water; surface wave and current data gathered using marine X-band radar to build a spatial map of variation in wave and tidal resource at the test site
    - Benthic Surveys - assessment of benthos in and around an operating tidal generator based on comparison of pre-and post-device installation ROV data surveys; sampling of test and control areas

The integrated environmental monitoring project is aimed at undertaking monitoring of marine mammals and diving birds in the close vicinity of an operating tidal turbine in order to assess the close-range behaviour and the potential risk of harm to marine species due to potential collision with devices. This is still a high priority issue of concern to the Regulator in Scotland during the licensing of marine devices.

In addition to the monitoring undertaken by EMEC at the site, developers have undertaken their own monitoring using a range of methods, which includes underwater video and drop-camera as well as using strain gauges to identify potential collision events. These methods show different degrees of success, and are being reviewed. Lessons learnt from this review will be shared via the Marine Scotland Interactive website.

6 DESIGN, LANDSCAPE AND VISUAL AMENITY

The Fall of Warness tidal test site is visible from some remote residences and minor roads. However, any visual impact of the test site is primarily of relevance to vessels in transit through the Stronsay and Westray Firths, including passenger ferries and some cruise ships.

The area is subject to moderate intensity use by a variety of other vessels, including those from the fishing, aquaculture and shipping sectors, which themselves contribute to the baseline visual environment. The presence of installation/support vessels associated with EMEC activities at the site is considered to have minimal impact, even where visually obtrusive, as all such activities are temporary and reversible, and will not be in-situ long enough to alter the seascape, coastal character or visual amenity at the site.

While the majority of tidal energy convertor devices do not include any surface-piercing or surface-buoyant aspects, there is a presence of surface-piercing and surface-buoyant devices already in existence at the Fall of Warness test site (namely the supporting infrastructure for the OpenHydro tidal turbine currently under test at the site, and the intermittent deployment of the ScotRenewables floating tidal energy conversion device – see Figure 7). There is potential for more surface-buoyant devices to be installed at the site in the future.

The Environmental appraisal conducted in 2013/14 (*EMEC 2014*) concludes that all potential impacts for all aspects of seascape, landscape and visual amenity can be regarded as unimportant.

7 COMMERCIAL FISHERIES

The main species fished in the area of the test site are brown, green and velvet crab, and lobsters. In the region of 12 creel fishing boats from Mainland Orkney and 2 from Westray regularly fish on the SW coast of Eday within the Fall of Warness, with the catch amounting to upwards of 30% of their total catch throughout Orkney. Individual vessels may have a greater reliance on the fishing stocks in the area, estimated as up to 50% in some cases (Orkney Fishermen's Association). Whilst scallop diving does take place in the Fall of Warness, it is understood that this activity is limited by safety constraints due to the high tidal flow at the site.

At its inception in 2004, EMEC identified consultation with local fishermen over development of the Fall of Warness tidal test site as a high priority. EMEC is keen to gain feedback from fishermen about proposed deployments at the site, and holds regular consultations and update meetings with Orkney Fisheries Association and Orkney Fishermen's Society in order to keep them informed of developments at the test site and seek their views on upcoming proposed deployments. Input from local fishermen proved invaluable when establishing the extent of the test site, with the boundary with the west coast of Eday amended to follow the 30 metre water depth contour line, and agreement that fishing activity could continue in the shallower waters out-with this boundary where there is no device testing or cable presence.

8 CONSTRUCTION AND OPERATIONS

There is no construction activity planned at the Fall of Warness test site as part of this Section 36 consent application, which represents a proposal to change only the consenting regime at the site. The EMEC Fall of Warness test site was constructed in 2005, when five cables were installed on the seabed, and became operational in 2006. In 2010 two further subsea cables were installed at the site in order to increase the number of test berths available to developers. One smaller cable installed at the site is currently owned by a technology developer company (identified as 'temporary' berth position 8 in Figure 2).

All operational activity at the site is subject to EMEC's Standard Operating Procedures (SOPs) and Emergency Response Procedures (ERPs). The latter have been agreed with the Maritime and Coastguard Agency (MCA).

No significant change in the frequency or duration of operational activity or associated vessel traffic is envisaged as a result of the proposed change in the consenting regime at the EMEC Fall of Warness test site.

9 ARCHAEOLOGY

An archaeological study commissioned in 2005 as part of the EIA for establishing the test site (*Aurora 2005*, Section 9.7) comprised a desk-based assessment followed by a walkover survey at the following sites:

- Cauldale: the sub-station building site and access road
- Greentoft Bay possible navigational marker site: the marker site with associated construction area and access
- Muckle Green Holm possible navigational marker site: the marker site with associated construction area and access
- Little Green Holm possible navigational marker site: the marker site with associated construction area and access
- The offshore test site: comprising the offshore area within the limits of the test site, including the cable routes and cable end positions

This study identified several sites of archaeological interest, none of which would be impacted by the development and operation of the test centre. In addition, recent seabed surveys carried out have uncovered no evidence of any wreckage. It is therefore considered extremely unlikely that any archaeological remains will be located, and the potential impact from operation of the test centre is considered to be negligible.

10 DESIGNATED SITES

The Fall of Warness test site does not sit within or directly adjacent to any existing designated Special Areas of Conservation (SAC) or Special Protected Areas (SPA) sites. However, there are 2 designated SAC and 14 SPA within the local area, which are described below. The test site is adjacent to the Muckle and Little Green Holm Site of Special Scientific Interest (SSSI). A full appraisal of the potential impact of the EMEC Fall of Warness test site on these sites is contained within *EMEC 2014,* Section 4*.*

The key conservation areas and protected sites in proximity to the Fall of Warness test site are shown in Figure 8 below.

10.1 Special Areas of Conservation

There are two SAC within relative proximity to the test site, with harbour and grey seal species respectively as a qualifying feature. Both of these SAC were considered in the environmental appraisal carried out in 2014.

10.1.1 Sanday SAC

Sanday SAC is located approximately 15km from the Fall of Warness test site, and has the largest colony of breeding harbour seals in Orkney. The EMEC test site is well within the foraging range of harbour seals from haul-outs, so it is likely that some of the seals from this SAC use the Fall of Warness for foraging and/or transit. However, this distance, plus the presence of other (albeit smaller) harbour seal haul-outs in the vicinity of the Fall of Warness and wider Orkney sea area, make it highly likely that a large proportion of the harbour seals present are *not* associated with the Sanday SAC. Also, there is a good availability of quality foraging habitat near Sanday that makes it unlikely that the Fall of Warness is important in this regard.

Harbour seals currently have an ‘unfavourable declining’ status; however it is notable that this declining trend precedes any activity at the Fall of Warness test site, and reflects trends throughout the north and east of Scotland.

The environmental appraisal concludes that activities at the EMEC Fall of Warness tidal energy test site will not adversely affect the integrity of the Sanday SAC.

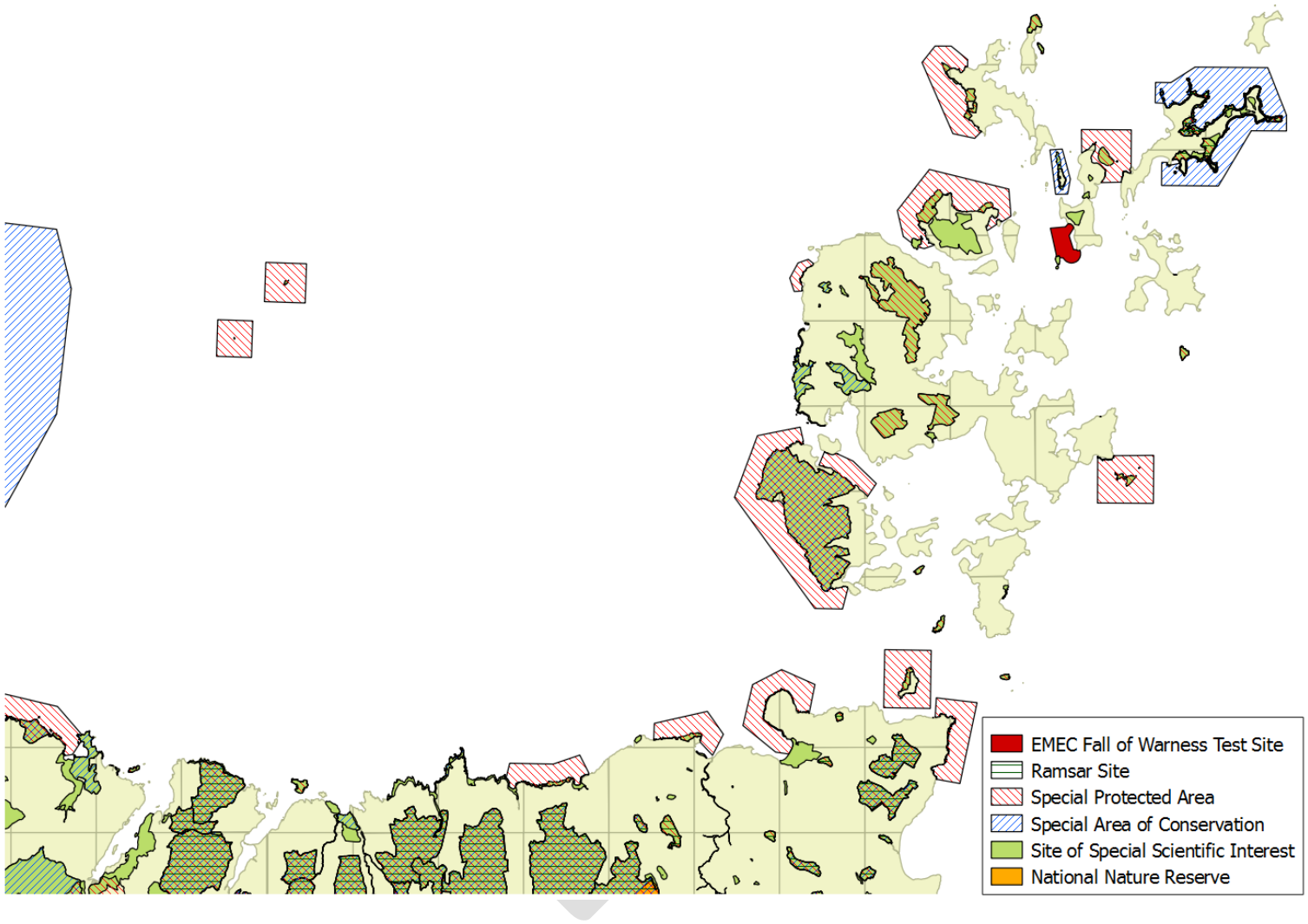

Figure 8: Conservation and protected sites in proximity to the EMEC Fall of Warness test site.

10.1.3 Faray and Holm of Faray SAC

Faray and Holm of Faray SAC is located approximately 4km to the north of the Fall of Warness test site and is one of the most important breeding and haul out sites for grey seals in Orkney. The site supports the third largest breeding colony of grey seals in the UK (and the fourth in the world).

The EMEC test site is well within the foraging range of grey seals from haul-outs, so it is likely that many of the seals from this SAC use the Fall of Warness for foraging and/or transit. However, there are several other grey seal haul outs in the vicinity and in Orkney generally, including some with even greater proximity to the Fall of Warness test site (e.g. Muckle Green Holm and Little Green Holm, and Seal Skerry). Consequently, it is highly likely that a large proportion of the grey seals present in the Fall of Warness are *not* associated with the Faray and Holm of Faray SAC. The grey seal population at this SAC is currently in 'favourable maintained' status and has not shown any changes that can be linked to activities at the EMEC test site to date.

EMEC 2014 concludes that activities at the EMEC Fall of Warness tidal energy test site will not adversely affect the integrity of the Faray and Holm of Faray SAC.

10.2 Special Protection Areas

The following SPA have been included in the Environmental appraisal carried out in 2014 (*EMEC 2014*) based on foraging range, impact pathway and consideration of bird usage of the Fall of Warness test site observed through the EMEC wildlife observation programme:

SPA Name
Calf of Eday SPA
Copinsay SPA
East Caithness Cliffs SPA
Fair Isle SPA
Hermaness, Saxa Vord and Valla Field SPA
Hoy SPA
Marwick Head SPA
North Caithness Cliffs SPA
North Rona and Sula Sgeir SPA
Noss SPA
Papa Westray (North Hill and Holm) SPA
Rousay SPA
Sule Skerry and Sule Stack SPA
West Westray SPA

Table 2: SPA in the vicinity of the EMEC Fall of Warness test site

A full assessment of the potential impact of the EMEC test site on these SPA is included in Section 4.10 of *EMEC 2014*. This appraisal concludes that the Fall of Warness test site will not adversely affect the integrity of any of the aforementioned SPA.

10.3 Sites of Special Scientific Interest (SSSI)

SSSI are designated under the Nature Conservation (Scotland) Act 2004 (as amended) and it is an offence for any person to intentionally or recklessly damage the protected natural features of an SSSI. There are several SSSI within proximity to the EMEC tidal energy test site at Fall of Warness, as described in the following sections.

10.3.1 Muckle and Little Green Holm SSSI

Muckle and Little Green Holm SSSI is immediately adjacent to southern part of the Fall of Warness test site. Comprising two neighbouring uninhabited islands (Muckle Green Holm and Little Green Holm), this SSSI regularly supports around 2% of the grey seal pups born in the UK and is one of the largest sites for breeding grey seals in Orkney. This SSSI is in 'favourable maintained' condition.

The environmental appraisal carried out in 2014 concludes that providing a 500m exclusion zone is applied around these islands, and the principles of the Scottish Marine Wildlife Watching Code (SMWWC) are followed, the EMEC test site will have no adverse impact on the notified feature of this SSSI (grey seal).

10.3.2 Other Nearby SSSI

Of the coastal SSSI in the immediate vicinity of the Fall of Warness, none have any bird species as notified features. Some other coastal SSSI in the wider area of Stronsay Firth and Westray Firth do have birds as notified features, and these sites could conceivably be adjacent to transit routes for some vessels in use at the Fall of Warness test site. However, these firths already support a moderate amount of vessel activity, including creel boats and ferries likely to operate in relatively shallow waters. Consequently, additional vessel traffic associated with the Fall of Warness is unlikely to add significantly to any disturbance impact.

Section 4.9.5 of *EMEC 2014* concludes that providing the principles of the SMWWC are followed by vessel skippers, the EMEC test site will have no adverse impact on the notified bird features of any nearby SSSI.

11 SPECIES, PLANTS, AND ANIMALS

This section describes the flora and fauna present at the Fall of Warness tidal test site and summarises the key sensitivities present. A detailed impact assessment, including collision modelling where appropriate, has been carried out on the receptors discussed in this section, and is reported in Section 4 of *EMEC 2014.* Section 6 of *Aurora 2005* describes the methodology adopted for assessing impacts. The assessment was carried out in a receptor-specific manner, with only species and habitats considered as being potentially impacted by changes at the site being assessed.

11.1 Benthic Environment

Useful information on the benthic species and habitats at the EMEC test site has been derived from a preliminary seabed survey carried out by EMEC in 2005 (see *Aurora 2005*, Section 4.2). This shows that the Fall of Warness sub-tidal area consists largely of scoured and tide-swept bedrock and boulders, with areas of broken bedrock amongst sub-littoral sandbanks in the shallower eastern and northern margins. Although largely bedrock and boulders in deeper areas, interstitial shell-sand is common in-between boulders from depths of 34-40m. Geogenic and sedimentary habitats support a variety of benthic species (see below), but throughout much of the site this comprises communities typical of tidally scoured areas.

11.1.1 Benthic Species

Benthic species associated with bedrock and boulder areas at the Fall of Warness are typical of this substrate type in tidally scoured areas of the north of Scotland, with some areas of rock being relatively bare in flora and fauna. From developer-specific surveys of berths, the southern and eastern berth-sites may exhibit slightly denser faunal turfs on top of bedrock, boulders and cobbles. *Laminaria spp*., and the associated red algae *Rhodymenia palmate*, is present throughout the area although denser in shallower more sheltered areas, with other common species including various encrusting coralline algae species, sea anemones, sea stars and a variety of crustacean species. Benthic species associated with sedimentary substrates are also typical, including common polychaetes, amphipods and bivalves. Infauna is relatively sparse within the mobile sandy substrates in some margins of the site. With the exception of a possible record of some scattered maerl debris (*Lithothamnion corallioi* or *Phymatolithon calcareum*) (*ScotRenewables 2011*), there have been no records of any benthic species listed as Priority Marine Features[1]

[1] http://www.snh.gov.uk/docs/A1327320.pdf

(PMF) on either the rocky or sandy substrates at Fall of Warness. Evidence to date does not suggest there is a maerl bed present, in which case it would not be regarded as a PMF. No live maerl has been reported.

11.1.2 Biogenic Habitat

Areas of relatively dense seaweed, including *Laminaria* spp., will provide biogenic habitat that supports a higher diversity and biomass of biota than area of bare rock or mobile sand. Biotope classification has not been completed, but this habitat may represent the PMF '*Kelp beds'*, or a component of the PMF *'Tide-swept algal communities'*. These habitat patches appear to be increasingly patchy with distance from shore. With the exception of seaweed habitats, there have been no records to date of species that would form sub-tidal biogenic habitats at the Fall of Warness site. Furthermore, given the tidally-scoured nature of the seabed at Fall of Warness, areas of seaweed habitat are likely to be sparse except in some of the relatively sheltered sub-littoral margins of the site near the cable landfall.

EMEC 2014, Section 4.1, concludes that while the development footprint includes some rocky reef habitat, any potential impacts on the physical integrity of sedimentary substrates and of rock, boulder and cobble substrates are not regarded as important at the scale of the development and in the context of the wider environment. Any potential impacts on the biogenic habitats and sessile and low-mobility benthic species are considered as not of ecological importance.

11.2 Fish and Shellfish

To date there has been no targeted survey of fish and shellfish at the test site.

In general, it is possible to make reasonable assumptions as to the species likely to be present, based primarily upon the habitats and physical conditions at the site. These include diadromous fish (salmon, trout, and eels), marine fish (including key species such as herring and mackerel, cod, saithe, butterfish, gobies, some flatfish and sandeels, common skate and spurdog) and marine shellfish (e.g. scallops, lobsters, velvet crab, brown crabs and squat lobsters).

While there have been anecdotal observations of fish and shellfish made during benthic surveys and seabed investigations, there have been no site-wide targeted surveys of fish and shellfish at the Fall of Warness test site. Some developer–specific studies have been undertaken, for example the study of Pollack (*P. pollachius*) by OpenHydro. This study indicated that Pollack seemed to exhibit an abundance response with a deployed tidal turbine. Aggregations appeared to be

influenced by turbine velocity, with higher velocity rates reducing the number of observations, and the suggestion that the device was acting as a refuge or feeding site.

EMEC 2014, Section 4.2, concludes that no important impacts of relevance to fish and shellfish ecology are expected from developments at the Fall of Warness test site.

11.3 Basking Shark

Land-based wildlife observations carried out by EMEC at the Fall of Warness test site between 2005 and 2009 show basking sharks recorded between June and October, with peak sightings in July and August. The number of observations has been variable, with more than forty in 2005, to fewer than five in 2009. Basking shark sightings at Fall of Warness reflect the general pattern of records from around Orkney, with peak records at the site being between July and September and very few records between November and April.

While *EMEC 2014*, Section 4.4, concludes that activities at the test site will not have any negative implications for the conservation status of basking sharks, a licence to disturb basking shark (see Section 2.4.6) is likely to be required by developers prior to commencing installation activities at the test site.

11.4 Cetaceans

Harbour porpoise is the most frequently sighted cetacean at the Fall of Warness test site. Other cetacean species recorded during the EMEC land-based wildlife observations include minke and killer whales, and white beaked and Risso's dolphin. Although other cetacean species could occur at the site, due to their higher occurrence these five species may be regarded as appropriate species to consider in relation to the potential risks to other cetacean species as well. For this reason, it is these five species that have been the subject of specific appraisal.

EMEC 2014, Section 4.5, concludes that the potential impacts from activities at the test site will not be detrimental to the maintenance of the population of the cetacean species concerned at Favourable Conservation Status in their natural range. Developers will be required to obtain a licence to disturb EPS (see Section 2.4.5) prior to commencing installation activities at the test site.

11.5 Seals

Both harbour seals and grey seals are regularly sighted at the Fall of Warness test site. The distribution of harbour seals across the site is significantly varied, concentrating around Sealskerry Bay on Eday. Grey seals are observed more frequently than harbour seals, with the highest proportion of all grey seal observations coinciding with their pupping season during the autumn months. Grey seals also vary significantly in their distribution across the test site, with numbers concentrated around Muckle Green Holm to the west of the site.

There are a number of designated haul out sites within the immediate vicinity of the tidal test site. These include Seal Skerry for harbour seals, Muckle Green Holm and Little Green Holm for grey seal breeding colonies, the eastern coastline of Egilsay, Rusk Holm and off the point at War Ness for both species of seal.

EMEC 2014, Section 4.7, includes a full Natura Appraisal in relation to nearby SAC (see Section 10.1) based on current knowledge of foraging range, impact pathways and consideration of seal usage on and near the test site. This appraisal concludes that activities at the EMEC Fall of Warness tidal energy test site will not adversely affect the integrity of these SAC.

11.6 Otters

Otters are ubiquitous around the coast of Orkney, with the shallow coastal waters and availability of freshwater near the coast providing ideal habitat. *Aurora 2005*, Section 4.2.7, concludes that otters use the area, with signs of foraging and rest areas present along the south-west coast of Eday and on Faray and Holm of Faray to the north of the test site.

EMEC 2014, Section 4.8, concludes that any disturbance impacts are only relevant in relation to cabling works (installation and or maintenance) in the near-shore and intertidal environment. It is considered that any activities at the actual berth sites are too far from shore to cause a disturbance impact to otters at holts or resting sites. Any interaction between an otter and an operational tidal turbine leading to injury or death is considered unlikely, and a licence to disturb EPS is therefore not likely to be required.

11.7 Seabirds

The EMEC wildlife observation programme has shown that a variety of seabird species utilise the Fall of Warness test site area. Table 3 below lists the range of seabird species typically sighted at the test site. Species observed in notable

abundance include eiders, red-throated divers, shags, cormorants, and black guillemots.

Species
Arctic Tern
Atlantic Puffin
Auk
Black Guillemot
Black Scoter
Black-legged Kittiwake
Black-throated Diver
Common Eider
Common Goldeneye
Common Guillemot
Diver Sp.
European Shag
Goosander
Great Cormorant
Great Northern Diver
Little Auk
Long-tailed Duck
Northern Gannet
Phalacrocorax Sp.
Razorbill
Red-breasted Merganser
Red-throated Diver
Sandwich Tern
Slavonian Grebe

Table 3: Seabirds typically sighted at the Fall of Warness test site

EMEC 2014, Section 4.10, includes a full Natura Appraisal in relation to breeding populations at nearby SPA (see Section 10.2). This appraisal concludes that activities at the EMEC Fall of Warness tidal energy test site will not adversely affect the integrity of these SPA.

12 WATER ENVIRONMENT

Marine water bodies within the vicinity of the test site are all considered by the Scottish Environment Protection Agency (SEPA) to be in good condition.

12.1 Potential Pollution

Pollution from the normal activity of vessels is strictly controlled by regulations that implement the International Convention for the Prevention of Pollution from Ships (MARPOL) and its various annexes and protocols. All vessel masters are required to adhere to MARPOL regulations and vessels are audited for safety by the MCA.

Section 11 of *Anatec 2010* outlines mitigation to reduce the risk of accidental vessel collision and reduce the risk of oil spills.

There may be small amounts of hydraulic oil in devices themselves. In the unlikely event that oil from tidal devices enters the environment, the volume is likely to be low and it is expected that the high energy site will disperse and dilute contaminants rapidly.

The anticipated impact of any potential pollution arising from the installation, operation and maintenance of the test site is considered to be of minor significance due to the limited potential for contaminants to enter the marine environment

12.2 Hydrology

The potential impacts on the onshore hydrology, geology and surface water relate to activities associated with construction of the onshore electricity sub-station and installation of the sub-sea electricity cables. Potential impacts include changes to surface water or groundwater flow patterns, potential releases of polluting materials, and the potential for flooding.

Construction of the onshore electricity sub-station was completed in 2007, and due to the small scale of any future additional onshore works together with adherence to best practice on site, these impacts will be of negligible significance.

13 NOISE

Potential sources of onshore noise associated with the test centre include drilling during construction of the sub-station, noise generated by onshore vehicles, and noise generated by marine vessels. The electricity sub-station on Eday is now fully constructed and operational, and any noise generated by onshore vehicles will be minimal and of a temporary nature. No significant onshore noise is predicted during operation of the test centre.

As there is no material development included within this consent application, no additional noise component (either onshore or offshore) will arise from this proposed change in consenting regime at the site.

14 NAVIGATION

The Fall of Warness is within an International Maritime Organisation (IMO) adopted "Area To Be Avoided" which requires all vessels over 5,000 tonnes carrying oil or other hazardous cargo to avoid the area designated. A Navigational Risk Assessment (NRA) for the Fall of Warness test site was undertaken in 2005, and updated in 2010 (*Anatec 2010*) to take into account the latest vessel activity data and guidance/experience available. On the advice of the MCA, EMEC undertakes vessel traffic surveys every two years to confirm the currency of the traffic levels. If substantial differences are noted, then the NRA will be updated. In general, the navigational risks associated with the test site are considered to be relatively low. This is in part due to the original site selection, which took into account the local traffic features, as well as the fact that the test site is now well established. The NRA made the following recommendations:

- All sea users will be informed of any intended works via a Notice to Mariners.
- All works will take place in conditions of calm weather and good visibility
- All vessels associated with works at the test site will have marking and lighting in accordance with COLREGS

The inherent nature of the channel makes it hazardous for small craft (leisure sailing/diving boats) however it is used by larger vessels. Cruise ships and pelagic fishing vessels use the channel for passage, creel fishermen operate in the area, and the inter-island ferries use a number of routes through the Fall of Warness in response to poor weather and associated sea conditions.

Any floating or surface-piercing fixed structures installed at the test site could potentially present a navigational risk to vessels using the channel. In order to mitigate this beyond the measures proposed in *Anatec 2010*, EMEC has consulted extensively with OIC Marine Services (the operator of the inter-island ferry service) over the years as each new developer deployed at the test site. This consultation is ongoing, and has seen the development of a mutually acceptable framework for determining the suitability of any proposed device for deployment at each berth.

Figure 9 below shows the main ferry routes used in bad weather, together with a 'traffic light' system used to give an initial indication of acceptability of floating or surface-piercing fixed structures at the different berths. The blue arrows give a generalised indication of some of the routes used by ferries in bad weather. Green circles indicate berths where floating and surface piercing fixed structures are likely to be acceptable. The yellow circle indicates a potential area for a floating device. Amber circles indicate berths where there are unlikely to be objections raised by Orkney Ferries due to navigational concerns (these berths would need careful

negotiation with stakeholders). Finally, red circles indicate the berths where any surface piercing fixed structure or floating devices is most likely to be problematic.

Whilst the framework indicated in Figure 9 provides a useful means of capturing general views about the placement of different types of devices at the Fall of Warness test site, it should be emphasised that actual deployment of specific devices may deviate from the generalised arrangement, by agreement with stakeholders, including Orkney Ferries.

The risk mitigation measures proposed in *Anatec 2010* are deemed appropriate to reduce any risk to shipping and navigation to an acceptable level.

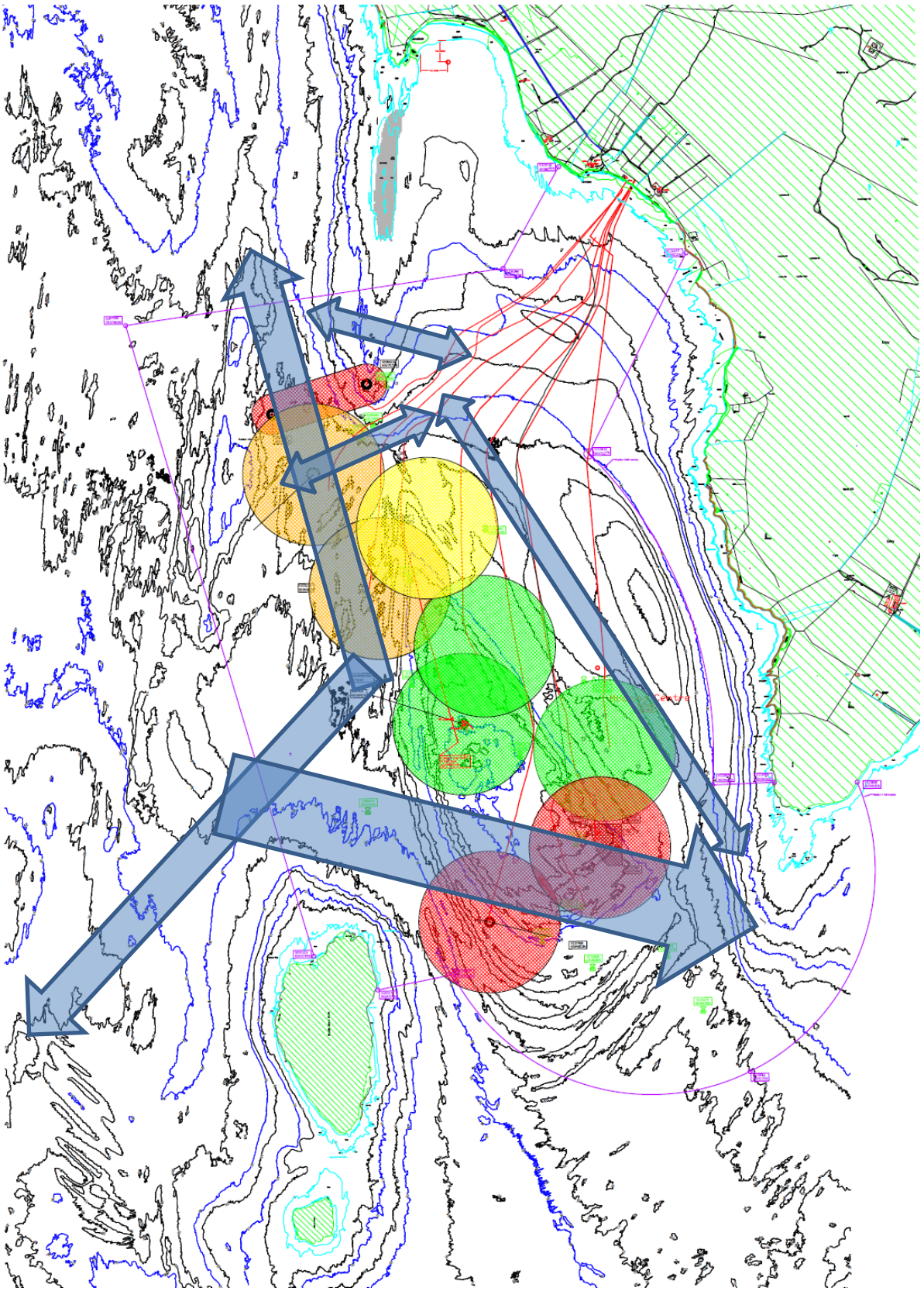

Figure 9: Schematic showing main ferry routes and possible device types at each berth (see main text in Section 14 for key).

15 CUMULATIVE IMPACTS

The environmental appraisal was based on a project envelope that describes maximum combined usage of the test site by multiple developers. The potential cumulative impact of the use of the Fall of Warness test site by multiple developers to deploy multiple devices, has therefore been taken into account in the environmental appraisal.

The NRA, and developer annexes to it, collectively addresses cumulative navigational risks at the site, and mitigation measures are in place to ensure that such risks minimised.

There are currently no other operational or consented marine renewable developments in the vicinity of the EMEC Fall of Warness tidal test site. There are two proposed tidal energy projects in the vicinity of the EMEC site: the Westray South Tidal Array (submission of consent application expected in 2015) is immediately adjacent and to the north of the site; and the Scotrenewables proposed Lashy Sound development off the east coast of Eday (currently at scoping stage).

Potential cumulative impacts (positive or negative) of these proposed developments in combination with the EMEC test site include:

- Impacts to commercial fisheries, including loss of access to fishing grounds, displacement to less profitable areas, increased steaming times, increased running costs and conflict between users of different gear.
- Impacts to marine mammals, through disturbance due to underwater noise, collision risk and displacement.
- Impacts to ornithology, through habitat loss, modification to migratory routes, collision risk and disruption to habitat function.
- Impacts to shipping and navigation, including constriction of shipping routes, increased navigational risk, increased travel and running costs.
- Impacts on local residents, including employment opportunities, improvements to local infrastructure, increased industrial activity and increased demand on social services during construction, with benefits to wider UK economy.
- Contributions to achieving Scottish and UK renewable energy targets and promotion of marine renewable energy technology.
- Benefits to emission reduction and climate and offset of traditional energy generation.

EMEC routinely consults with key stakeholders (including local fishing organisations, ferry operators, SNH, MCA and NLB) regarding developments at the test site in order to identify and mitigate any potential issues.

Given that the EMEC test site is well established and has been operating successfully for some years now, the potential cumulative impacts associated with the site are not considered to be significant and do not require any mitigation over and above that already in place. Proposers of any new developments in the vicinity of the EMEC test site will be required to fully consider the potential cumulative impact of their proposal.

Other proposed tidal energy projects in the Pentland Firth area are far enough away from the EMEC test site to not present any likely cumulative impacts.

16 DECOMMISSIONING

In accordance with the Energy Act 2004, EMEC will establish a Decommissioning Programme (DP) for the site infrastructure only.

EMEC's seabed lease with The Crown Estate currently expires in 2022 and the DP will be developed in line with this timescale. Any requirements of the lease will be incorporated within the DP, and obligations will be passed on to site tenants via the EMEC client contract process as appropriate.

The DP will consider the latest technological developments, legislation and environmental requirements in place at the time that the work is due to be carried out.

It is anticipated that decommissioning of project-related structures will remain the responsibility of individual developers (enforced through condition of Marine Licence) although EMEC is currently (December 2014) progressing discussions with DECC on options for introducing efficiencies through streamlining of the decommissioning process.

17 OTHER INFORMATION

17.1 Data Available

In addition to the monitoring projects described in Section 5.2, in order to identify the environmental receptors that might be sensitive to the construction and installation of the test site infrastructure, EMEC commissioned several supporting studies to inform *Aurora 2005*. Data is available from the following studies:

- Terrestrial habitat and vegetation survey
- Coastal habitats survey
- Coastal and seabed processes review
- Seabed surveys
- ROV cable surveys
- Assessment of birds, cetaceans, sea mammals & coastal wildlife
- Assessment of otter populations
- Archaeological, visual & landscape
- Navigational risk assessments
- Surface wildlife observations
- Site underwater acoustic characterisation

Extensive documentation relating to environmental appraisal, including outputs from detailed encounter rate modelling, has been produced from the SNH review carried out in 2013/14 (reported in *EMEC 2014*).

18 STAKEHOLDER ENGAGEMENT

EMEC recognises the importance of effective stakeholder engagement. Table 4 below lists the key stakeholders which EMEC has consulted in relation to its Section 36 consent application for the Fall of Warness test site (as agreed with Marine Scotland Energy Consents Unit).

Organisation
Government, Regulators and Councils
Marine Scotland, including Scottish Government Energy Consents Unit (ECU)
Orkney Islands Council (OIC)*
The Crown Estate (TCE)
Department of Energy & Climate Change (DECC)
Scottish Government Planning
Navigation and Transport
Orkney Islands Council Marine Services
Maritime and Coastguard Agency (MCA)
Northern Lighthouse Board (NLB)
Royal Yachting Association (RYA)
Nature Conservation and Archaeology
Scottish Natural Heritage (SNH)* - to include onward consultation with SMRU
Scottish Environmental Protection Agency (SEPA)*
Royal Society for Protection of Birds (RSPB)
Commercial Fisheries
Orkney Fisheries Association (OFA)
Orkney Fishermen's Society (OFS)
Orkney Dive Boat Owners' Association
Scottish fisheries organisations as advised by MS-LOT and ECU
Other Local Stakeholder Groups
Eday residents

Table 4: List of key stakeholders

*statutory consultees for Section 36 consent applications

19 REFERENCES

EMEC Tidal Test Facility Fall of Warness Environmental Statement: June 2005 **(Aurora 2005)**

EMEC Fall of Warness Navigational Risk Assessment: May 2010
(Anatec 2010)

Seabed survey report: cable route and potential mooring locations at Fall of Warness test site. Issued by: Aquatera Ltd; P353 – September 2010-January 2011
(ScotRenewables, 2011)

EMEC Fall of Warness Test Site Environmental Appraisal: August 2014
(EMEC 2014)

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