

**APPLICATION FOR CONSENT UNDER SECTION 36 OF THE ELECTRICITY ACT 1989 FOR THE CONSTRUCTION AND OPERATION OF A TIDAL ENERGY TEST CENTRE WITH A GENERATING CAPACITY OF UP TO 10 MW AT THE EXISTING EUROPEAN MARINE ENERGY CENTRE, FALL OF WARNESS, ADJACENT TO THE ISLAND OF EDAY, ORKNEY**

**MARINE SCOTLAND'S CONSIDERATION OF A PROPOSAL AFFECTING A DESIGNATED SPECIAL AREAS OF CONSERVATION ("SAC") OR SPECIAL PROTECTION AREA ("SPA")**

**European Marine Energy Centre Tidal Test Facility – Fall of Warness, Orkney**

**Appropriate Assessment Conclusion – Marine Scotland Licensing Operations Team ("MS-LOT") concludes that, based upon the content of the following assessment, the installation and operation of devices at the Fall of Warness tidal test site will not adversely affect the integrity of any SPA's or SAC's considered to have connectivity if the devices are within the design envelope detailed in this document and as long as conditions in any associated marine licence are complied with.**

**Introduction**

This is a record of the Appropriate Assessment ("AA") of the installation and operation of tidal energy converters at the European Marine Energy Centre ("EMEC") Fall of Warness tidal test site. The assessment has been undertaken by MS-LOT and MSS on behalf of the Scottish Ministers. This assessment is required to be undertaken under Council Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora ("the Habitats Directive") and Council Directive 79/409/EEC on the conservation of wild birds (as amended, and codified by Directive 2009/147/EC of the European Parliament and of the Council) ("the Wild Birds Directive") as implemented, in particular, by Regulation 61 of the Conservation of Habitats and Species Regulations 2010 and Regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994 ("The Habitats Regulations"). As the operations will require both a section 36 consent and a marine licence, both these Habitats Regulations apply.

MS-LOT, on behalf of the Scottish Ministers as the 'competent authority' under the Habitats Regulations, has to be satisfied that the projects will not adversely affect the integrity of any European protected sites (SACs and SPAs) before it may recommend the grant of consent. The precautionary principle requires to be applied when complying with obligations under the Habitats Directive and in preparing an AA. In accordance with the ECJ case of *Waddenzee*<sup>1</sup> the Scottish Ministers may only authorise a development if they are certain that it will not adversely affect the integrity of European protected sites; and "that is the case where no reasonable scientific doubt remains as to the absence of such effects".

<sup>1</sup> ECJ Case no - C-127/02 – judgment issued on 07.09.2004.

A detailed appraisal was completed by Scottish Natural Heritage ("SNH") and EMEC which has informed this assessment. SNH have also been consulted on this assessment, as is required, under the Habitats Regulations. Those Regulations

allow for the competent authority to consult the general public on the AA if they consider it appropriate. This has not been done as the general public have already had the opportunity to respond to the applications through the Environmental Impact Assessment (“EIA”) process where information regarding the potential impacts on European protected sites was available in the Environmental Statements (“ES”) provided for the Fall of Warness site. No public representations were received. Consultation responses regarding Natura issues were received from the Royal Society for the Protection of Birds, Scotland (“RSPB Scotland”) and Whale and Dolphin Conservation (“WDC”).

This assessment was originally completed on 3<sup>rd</sup> February 2015, however, since then new information has come forward and, as the determination on the Fall of Warness section 36 consent application had not yet been made, this assessment has been revised so that the most up to date information and evidence has been included in the assessment.

A map showing the location of the Fall of Warness site along with the SACs and SPAs which are considered in this assessment is presented below.

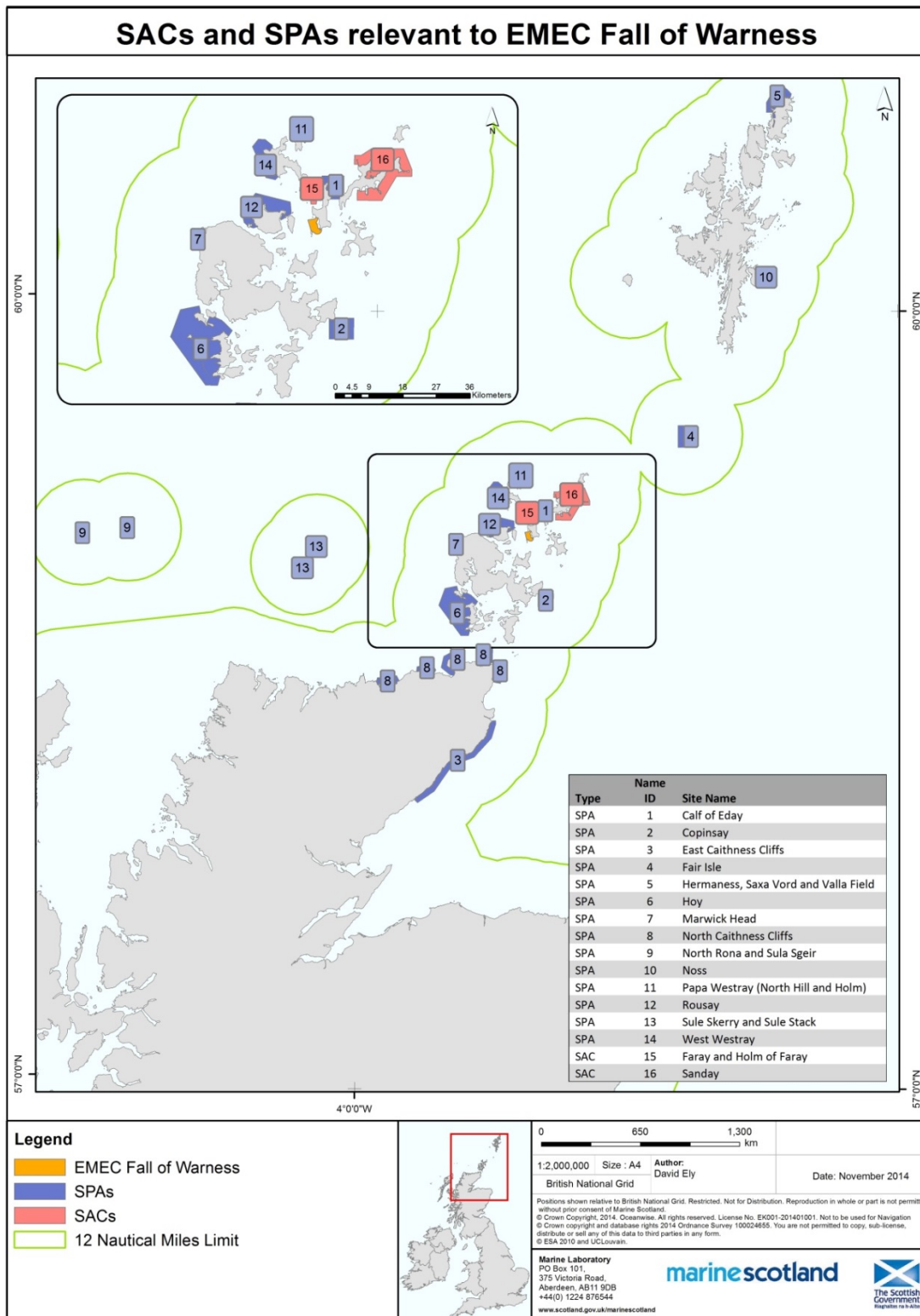


Figure 1: location of the Fall of Warness site along with the SACs and SPAs which are considered in this assessment.

**1a. Name of Natura site affected & current status available from:**

<b><u>SAC/SPA Name</u></b>
<a href="#"><u>Sanday SAC</u></a>
<a href="#"><u>Faray and Holm of Faray SAC</u></a>
<a href="#"><u>Calf of Eday SPA</u></a>
<a href="#"><u>Copinsay SPA</u></a>
<a href="#"><u>East Caithness Cliffs SPA</u></a>
<a href="#"><u>Fair Isle SPA</u></a>
<a href="#"><u>Hermaness, Saxa Vord and Valla Field SPA</u></a>
<a href="#"><u>Hoy SPA</u></a>
<a href="#"><u>Marwick Head SPA</u></a>
<a href="#"><u>North Caithness Cliffs SPA</u></a>
<a href="#"><u>North Rona and Sula Sgeir SPA</u></a>
<a href="#"><u>Noss SPA</u></a>
<a href="#"><u>Papa Westray (North Hill and Holm) SPA</u></a>
<a href="#"><u>Rousay SPA</u></a>
<a href="#"><u>Sule Skerry and Sule Stack SPA</u></a>
<a href="#"><u>West Westray SPA</u></a>

**1b. European qualifying interests (all non-priority)**

<b>Name of SPA or SAC</b>	<b>Qualifying interest</b>
<b>Sanday SAC</b>	Common (harbour) seal Intertidal mudflats and sandflats Reefs Subtidal sandbanks
<b>Faray and Holm of Faray SAC</b>	Grey seal
<b>Calf of Eday</b>	Seabird assemblage, breeding Great cormorant, breeding Northern fulmar, breeding Great black-backed gull, breeding Common guillemot, breeding Black-legged kittiwake, breeding
<b>Copinsay SPA</b>	Seabird assemblage, breeding Northern fulmar, breeding Great black-backed gull, breeding Common guillemot, breeding Black-legged kittiwake, breeding
<b>East Caithness Cliffs SPA</b>	Seabird assemblage, breeding Great cormorant, breeding Northern fulmar, breeding Great black-backed gull, breeding Common guillemot, breeding Herring gull, breeding Black-legged kittiwake, breeding Peregrine falcon, breeding Atlantic puffin, breeding Razorbill, breeding Shag, breeding

<b>Fair Isle SPA</b>	<p>Seabird assemblage, breeding  Arctic skua, breeding  Arctic tern, breeding  Fair Isle wren, breeding  Northern fulmar, breeding  Northern gannet, breeding  Great skua, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding  Atlantic puffin, breeding  Razorbill, breeding  European shag, breeding</p>
<b>Hermaness, Saxa Vord and Valla Field SPA</b>	<p>Seabird assemblage, breeding  Northern fulmar, breeding  Northern gannet, breeding  Great skua, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding  Atlantic puffin, breeding  Red-throated diver, breeding  European shag, breeding</p>
<b>Hoy SPA</b>	<p>Seabird assemblage, breeding  Arctic skua, breeding  Northern fulmar, breeding  Great skua, breeding  Great black-backed gull, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding  Peregrine falcon, breeding  Atlantic puffin, breeding  Red-throated diver, breeding</p>
<b>Marwick Head SPA</b>	<p>Seabird assemblage, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding</p>
<b>North Caithness Cliffs SPA</b>	<p>Seabird assemblage, breeding  Northern fulmar, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding  Peregrine falcon, breeding  Atlantic puffin, breeding  Razorbill, breeding</p>
<b>North Rona and Sula Sgeir SPA</b>	<p>Seabird assemblage, breeding  Northern fulmar, breeding  Northern gannet, breeding  Great black-backed gull, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding  Leach's storm-petrel, breeding  Atlantic puffin, breeding  Razorbill, breeding  European storm petrel, breeding</p>
<b>Noss SPA</b>	<p>Seabird assemblage, breeding  Northern fulmar, breeding  Northern gannet, breeding  Great skua, breeding  Common guillemot, breeding  Black-legged kittiwake, breeding</p>

	Atlantic puffin, breeding
<b>Papa Westray (North Hill &amp; Holm) SPA</b>	Arctic tern, breeding Arctic skua, breeding
<b>Rousay SPA</b>	Seabird assemblage, breeding Arctic skua, breeding Arctic tern, breeding Northern fulmar, breeding Common guillemot, breeding Black-legged kittiwake, breeding
<b>Sule Skerry and Sule Stack SPA</b>	Seabird assemblage, breeding Northern gannet, breeding Common guillemot, breeding Leach's storm-petrel, breeding Atlantic puffin, breeding European shag, breeding European storm petrel, breeding
<b>West Westray SPA</b>	Seabird assemblage, breeding Arctic skua, breeding Arctic tern, breeding Northern fulmar, breeding Common guillemot, breeding Black-legged kittiwake, breeding Razorbill, breeding

### 1c. Conservation objectives for qualifying interests:

#### Conservation Objectives

##### **SACs – Marine Mammals** (SAC's as listed in 1b above)

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying species that the following are maintained in the long term:

- (i) Population of the species as a viable component of the site.
- (ii) Distribution of the species within the site.
- (iii) Distribution and extent of habitats supporting the species.
- (iv) Structure, function and supporting processes of habitats supporting the species.
- (v) No significant disturbance of the species.

As the test site does not overlap with either of the identified SACs, the conservation objectives that require consideration are (i) population of the species as a viable component of the SAC, and (v) significant disturbance to the qualifying species as these can include impacts to seals while they are outwith the SAC. Other conservation objectives of relevance outside the SAC do not require further consideration due to the distances involved and/or scale of the proposal.

##### **SPAs** (all SPAs as listed in 1b above)

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

To ensure for the qualifying species that the following are maintained in the long term:

- (i) Population of the species as a viable component of the site
- (ii) Distribution of the species within site
- (iii) Distribution and extent of habitats supporting the species
- (iv) Structure, function and supporting processes of habitats supporting the species
- (v) No significant disturbance of the species

As the test site does not overlap with any of the identified SPAs, the conservation objectives that require consideration are (i) population of the species as a viable component of the SPA and (v) significant disturbance to the qualifying species, as these can include impacts to birds while they are outwith the SPA. Other conservation objectives of relevance outside the SPA do not require further consideration due to the distances involved and/or scale of the proposal.

## PROPOSAL DETAILS

<b>2a. Proposal title &amp; name of consultee (i.e. applicant or competent authority)</b>	
Fall of Warness s36 application for EMEC	Marine Scotland
<b>2b. Date of Consultation:</b> SNH were consulted on the draft AA, and provided a response on the 15 <sup>th</sup> January 2015, SNH were consulted on the updated AA, they responded on the 16 <sup>th</sup> September 2015 but had no further comments.	
<b>2c. Type of Case:</b> Tidal Turbines	

### 2d. Details of proposed operation

The tidal test site at the Fall of Warness has been in existence since 2005. There are currently (as of July 2014) 8 berths, all assigned to different developers.

In order to streamline the consenting process, EMEC has applied for a single site-wide section 36 consent to apply to the Fall of Warness tidal energy test site as a whole site. The application is for a generic site-wide section 36 consent to generate electricity up to a maximum total output of 10 MW. 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.

For further details please see the [EMEC ES](#) and the introduction in Section 1 and the description in Annex 1 of the [Fall of Warness Environmental Appraisal Document](#), together with the Project Envelope below which explain the parameters of the devices included within this appraisal.

The following activities / deployments are included within the project envelope (see Annex 1 Fall of Warness Environmental Appraisal Document) and should be considered for each receptor appraisal:

- 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 (up to a total of 18 rotors) at any one time, thereby supporting the testing of small arrays or additional non-grid-connected devices.
- Deployment of scientific instrumentation and associated cabling (see Section 6 for details).
- 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 (see Section 4.4.2 for details).

The following activities are **not** covered by this 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, notified through the Notification of Site Survey procedures).
- Installation of energy storage devices above MHWS.
- Use of acoustic deterrent devices.
- Deployment and operational activities outside the parameters defined in the EMEC Fall of Warness Tidal Test Site: Environmental Appraisal.
- Decommissioning

Under the project envelope the Development 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



A summary of the default device/rotor maxima and other key envelope parameters are provided in Table 1 below.

*Table 1: Key development envelope maxima for EMEC Fall of Warness tidal test site*

<b>Design/activity parameter</b>	<b>Project Envelope Maxima</b>
Mooring / foundation design and installation method	As per section 3.2 of the EMEC Fall of Warness Tidal Test Site: Environmental Appraisal.
Rotor diameter	25 m (open-bladed rotors).
Number of simultaneous turbines/rotors	12 devices with up to 18 rotors
Rotor depth	Minimum depth - 2.5 m clearance from sea surface

Modelling has been carried out on the “worst case scenario” of an open bladed turbine with a 25 m rotor diameter for all berths devices and rotors above simultaneously.

**ASSESSMENT IN RELATION TO REGULATION 48 OF THE CONSERVATION (NATURAL HABITATS, &C.) REGULATIONS 1994 AND REGULATION 61 OF THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010**

**3a. Is the operation directly connected with or necessary to conservation management of the site?**

No.

**3b. Is the operation likely to have a significant effect on the qualifying interest? Repeat for each interest on the site.**

**SACs**

**Marine Mammals**

**Summary of potential impact pathways on harbour and grey seals from the installation, operation and maintenance of tidal turbines at the Fall of Warness Tidal Test Site:**

**Installation**

- Underwater noise from active acoustic equipment leading to disturbance
- Installation vessel (s) transits and manoeuvring leading to disturbance
- Underwater noise from foundation / mooring installation methods and vessels leading to: auditory injury (permanent or temporary), death or disturbance
- Interaction with vessel propellers (e.g. Kort or some types of Azimuth thrusters) leading to: death from corkscrew injuries

**Operation and maintenance**

- Underwater noise from active acoustic equipment leading to disturbance
- Maintenance vessel (s) transits and manoeuvring leading to disturbance
- Underwater noise from operating turbines leading to: auditory injury (permanent or temporary), death or disturbance\*
- Collision with operating turbine blades leading to: injury or death
- Presence of tidal device (s) and associated infrastructure leading to: barrier effects
- Entanglement in lines or cabling leading to: injury or death
- Interaction with vessel propellers (e.g. Kort or some types of Azimuth thrusters) leading to: death from corkscrew injuries

**In the appraisal completed by SNH and EMEC which forms part of the Fall of Warness Tidal Test Site Environmental Appraisal Likely Significant Effect (“LSE”) was identified as follows:**

- Sanday SAC – Harbour (Common) Seal
- Faray and Holm of Faray SAC – Grey Seal

Marine Scotland agree with the identification of LSE on the above and consider that there will be no LSE on the habitat features of the Sanday SAC due to the test site being 15 km from the SAC.

#### **Diadromous Fish**

SNH did not identify LSE on any SACs with Atlantic salmon as a qualifying interest. SNH identified potential impact pathways on salmon as follows:

- noise disturbance during installation and operation of devices,
- collision with turbines,
- barrier effects from turbines, and
- electro-magnetic fields (EMF).

The SNH / EMEC appraisal concluded that some diadromous fish may utilise rivers on Orkney (for salmon, this is restricted to larger rivers on Orkney Mainland and the island of Hoy). There is a possibility that some diadromous fish in Orkney waters may utilise rivers on mainland Scotland, but based on current knowledge the degree of connectivity of these rivers with Orkney was expected to be low (Malcolm et al., 2010).

MSS provided advice on the 11<sup>th</sup> September 2015 advising that recent information including post release movements of adult salmon tagged in 2013 and 2014 on the north coast of Scotland (Godfrey et al, 2014) suggests that greater numbers of adult salmon than previously realised may be present around Orkney. MSS consider that these could include salmon returning to SAC rivers. MSS do, however, note that the test site is small scale and of a temporary nature and that this can still lead to a conclusion of no LSE.

Based on the advice from SNH and MSS, MS-LOT conclude that there is no LSE on Atlantic Salmon SACs, therefore these are not considered further in this assessment.

#### **SPAs**

**Summary of potential impacts pathways on bird qualifying features from the installation, operation and maintenance of tidal turbines at the Fall of Warness Tidal Test Site:**

Table 2. below provides a summary of the potential impact pathways identified for each bird species according to those activities likely to occur through the installation, operation and maintenance of tidal turbines at the Fall of Warness tidal test site. Please refer to Table 43, Table 44 and in Section 4.9 of the [Fall of Warness Environmental Appraisal](#) for further commentary on these impact pathways.

Table 2. Impact Pathways

<b>Marine Works Phase</b>	<b>Installation</b>	<b>Operation or maintenance</b>
<b>Impact pathway</b>		
Installation and maintenance vessel(s) transits, manoeuvring and activity (includes noise) leading to disturbance*	Northern gannet Great cormorant Common guillemot Razorbill Atlantic puffin Arctic Skua Great Skua	See left
Loss of/alteration to foraging habitat (includes indirect effects)	Great cormorant Common guillemot Razorbill Atlantic puffin Arctic skua Great skua	See left
Collision with turbine blades leading to: injury or death	Not applicable to installation – see operation or maintenance column	Northern gannet Great cormorant Common guillemot Razorbill Atlantic puffin
Presence of tidal device and associated infrastructure leading to displacement (including underwater noise from operational turbines)	Not applicable to installation – see operation or maintenance column	Northern gannet Great cormorant Common guillemot Razorbill Atlantic puffin Arctic skua Great skua
Presence of tidal device infrastructure leading to attraction, specifically roosting/resting opportunities	Not applicable to installation – see operation or maintenance column	Great cormorant Common guillemot Razorbill Atlantic puffin
Presence of below surface artificial lighting leading to attraction and potentially collision with turbine blades	Not applicable to installation – see operation or maintenance column	Northern gannet Great cormorant Common guillemot Razorbill Atlantic puffin

**In the appraisal completed by SNH and EMEC which forms part of the Fall of Warness Tidal Test Site Environmental Appraisal Likely Significant effect was identified as follows:**

- Calf of Eday SPA - Great cormorant, common guillemot, seabird assemblage\*
- Copinsay SPA - common guillemot, seabird assemblage\*
- East Caithness Cliffs SPA - common guillemot, Atlantic puffin, seabird assemblage\*
- Fair Isle SPA - northern gannet, common guillemot, great skua, Atlantic puffin, seabird assemblage\*
- Hermaness, Saxa Vord and Valla Field SPA - northern gannet, seabird assemblage\*
- Hoy SPA - Arctic skua, great skua, common guillemot, Atlantic puffin, seabird assemblage\*
- Marwick Head SPA - common guillemot, seabird assemblage\*
- North Caithness Cliffs SPA - common guillemot, Atlantic puffin, razorbill, seabird assemblage\*
- North Rona and Sula Sgeir SPA - northern gannet, seabird assemblage\*
- Noss SPA - northern gannet, seabird assemblage\*
- Papa Westray (North Hill & Holm) SPA - Arctic skua
- Rousay SPA - Arctic skua, common guillemot, seabird assemblage\*
- Sule Skerry and Sule Stack SPA - northern gannet, common guillemot, Atlantic puffin, seabird assemblage\*
- West Westray SPA - common guillemot, razorbill, Arctic skua, seabird assemblage\*

\* As there is a potential for the tidal test site to have a LSE on one or more of the species included in the seabird assemblage it follows that there is also the potential to have a LSE on the seabird assemblage.

MS-LOT agree with the identification of LSE highlighted by SNH.

**For the other qualifying interests listed in section 1b above no LSE was identified, therefore these species are not considered further in this assessment.**

Decommissioning will be dealt with separately on a case-by-case basis and is not dealt with as part of this appraisal process.

**3c. Appropriate assessment of the implications for the site in view of the site's conservation objectives.**

Table 3. below gives details of the devices which are currently installed at the Fall of Warness test site. This will be updated as new marine licence applications come forward to ensure that the devices are within the design envelope which has been assessed.

Table 3. Devices Installed at EMEC Falls of Warness

Berth	Device	Number of rotors and blades (rotor/blades)	Operator	Within design envelope	AA amendment required
1	AHH	1/3	Hammerfest	yes	No
2	TGL 1MW	1/3	Alstom	yes	No
3	Empty				
4	OpenHydro	1/Fan bladed	OpenHydro	yes	No
5	SR2000 (proposed)	2/4	Scotrenewables	yes	No
6	Atlantis	1/3	Atlantis Resource Ltd.	yes	No
7	Hytide	1/3	Voith	yes	No
8	Empty				
9	Not Cabled yet				

This AA has been based on the [Fall of Warness Tidal Test Site Environmental Appraisal \(FoWTTSEA\)](#) document completed by SNH and EMEC to support the [Environmental Statement](#). The SNH / EMEC appraisal concluded that Fall of Warness Tidal Test site would not adversely affect the integrity of any of the SACs or SPAs where LSE was identified in section 3b.

The SNH / EMEC appraisal has been reviewed by Marine Scotland Science (MSS) who are in agreement with the findings and conclusions. For seals and SACs see part 4.7, for birds see 4.10 of the FoWTTSEA.

MS-LOT agree with the conclusions of the SNH / EMEC appraisal:

No adverse effect on the integrity of the Sanday or Faray and Holm of Faray SACs with respect to harbour seals and grey seals respectively.

No adverse effect on the integrity of the following SPAs with respect to the qualifying interests where LSE was identified:

- Calf of Eday SPA - Great cormorant, common guillemot, seabird assemblage
- Copinsay SPA - common guillemot, seabird assemblage
- East Caithness Cliffs SPA - common guillemot, Atlantic puffin, seabird assemblage

- Fair Isle SPA - northern gannet, common guillemot, great skua, Atlantic puffin, seabird assemblage
- Hermaness, Saxa Vord and Valla Field SPA - northern gannet, seabird assemblage
- Hoy SPA - Arctic skua, great skua, common guillemot, Atlantic puffin, seabird assemblage
- Marwick Head SPA - common guillemot, seabird assemblage
- North Caithness Cliffs SPA - common guillemot, Atlantic puffin, razorbill, seabird assemblage
- North Rona and Sula Sgeir SPA - northern gannet, seabird assemblage
- Noss SPA - northern gannet, seabird assemblage
- Papa Westray (North Hill & Holm) SPA - Arctic skua
- Rousay SPA - Arctic skua, common guillemot, seabird assemblage
- Sule Skerry and Sule Stack SPA - northern gannet, common guillemot, Atlantic puffin, seabird assemblage
- West Westray SPA - common guillemot, razorbill, Arctic skua, seabird assemblage

The RSPB in response to the ES consultation raise concerns regarding the use of the 98% avoidance rate in the SNH / EMEC appraisal. The RSPB advise that the assessment should accommodate the uncertainties by considering a wider range of avoidance rates when forming its conclusions to ensure the risks to the environment are addressed appropriately and it is likely that this range at the lower end should be under 90%. The RSPB also advise that at the maximum scenario a precautionary approach may result in instances of significant adverse effects on national and international features of nature conservation interest.

The appraisal completed by SNH and EMEC included avoidance rates of: 50%, 90%, 95%, 98% and 99% (see table 4 below), and impacts on SPA qualifying interests are discussed for 90-99% avoidance within the SNH / EMEC appraisal. The in-combination assessment completed below uses the 98% avoidance rate (see table 6), however, even if lower avoidance rates were used 90% or 95% the conclusions would remain the same, due to small numbers predicted to collide, compared with the SPA populations. In addition the assessment has been precautionary as all the devices have been assumed to be operating all the time and predicted collisions are assigned to all SPAs with no apportioning.

Table 4. Annual estimated collision rate (birds / yr) for the maximum scenario, assuming 0%, 50%, 90%,95%, 98% and 99% avoidance . These figures assume that devices are 100% operationally active, i.e. operating whenever the tide is suitable.

	Assumed Avoidance rate					
	0%	50%	90%	95%	98%	99%
<b>Eider</b>	81.7	40.9	8.2	4.1	1.6	0.8
<b>Red-throated diver</b>	11.4	5.7	1.1	0.6	0.2	0.1
<b>Gannet</b>	1.5	0.8	0.2	0.1	0.0	0.0
<b>Cormorant</b>	80.3	40.1	8.0	4.0	1.6	0.8
<b>Shag</b>	151	75.5	15.1	7.5	3.0	1.5
<b>Common guillemot</b>	347	173	35	17	6.9	3.5
<b>Razorbill</b>	4.6	2.3	0.5	0.2	0.1	0.0
<b>Puffin</b>	24.2	12.1	2.4	1.2	0.5	0.2

The RSPB raise the issue of timescales and year on year impacts over the course of the lease period. The lease period is until 2022 and MS-LOT consider that the appraisal is precautionary as it takes account of a maximum-case build-out scenario based on the project envelope where all available berths within the test site are developed and operating at capacity. In reality as this is a test site there will often be devices not operating or berths not occupied. MS-LOT consider that even over the remaining lease period of 7 years, the yearly impacts are so low that the impacts over this period would be acceptable.

The RSPB also raised concerns that the North Orkney marine draft SPA and other draft SPAs had not been considered in the appraisal completed by SNH/EMEC. MS-LOT have not included these draft designations in this AA. Once Scottish Ministers have agreed the case for the dSPA to be the subject of a public consultation, the proposal is given the status of 'pSPA' and receives policy protection from that point forward until a decision on classification of the site is made. This policy protection for pSPAs is provided by Scottish Planning Policy (paragraph 210), the UK Marine Policy Statement (paragraph 3.1.3) and the National Marine Plan for Scotland (paragraph 4.45). Following designation if LSE is identified on any new SPAs then the Scottish Ministers will consider whether the marine licence/s ought to be varied, suspended or revoked under powers provided by the Marine (Scotland) Act 2010 ("the 2010 Act").

A response from WDC to the ES consultation highlighted concerns over the Sanday SAC harbour seal population and advised that until the cause of the decline of harbour seals in Orkney and the north and east of Scotland has been established there should be no more anthropogenic pressure placed on the population. WDC also raise concerns about MS issuing licences to shoot seals in this area where the

PBR is very low and the population is declining. It should be noted that MS has taken the decision not to issue any seal licences in respect of harbour seals in the Orkney and North Coast management unit this year. MS-LOT agree with the SNH view that with predicted collisions of 0.34 animals per year under an assumed 98% avoidance rate and predominance of U-shaped dives, the annual collision rates are unlikely to be statistically distinguishable from natural mortality of animals from the SAC. In addition there is a high likelihood that a large proportion of seals using the Fall of Warness are not associated with the SAC,

### **In-combination Assessment**

When considering other projects to include in the in-combination assessment, MS-LOT have included projects which have already been consented by Marine Scotland, where LSE has been identified in the appropriate assessments for these developments on the same qualifying interests and protected sites as the FoW test site.

### **SACs**

MS-LOT do not consider that there are any other projects which require an in-combination assessment for the Sanday SAC or Faray and Holm of Faray SAC. No LSE was identified for MeyGen which is considered to be out with the foraging range of the seals from these SACs. There are no other non-renewable projects in the area which require an in-combination assessment.

### **SPAs**

For SPAs table 5. highlights the potential for in-combination effects:

Table 5. Projects to be Considered in the In-combination Assessment

SPA	Species	Project considered in-combination			
		MeyGen	BOWL	MORL	EOWDC
North Caithness Cliffs	guillemot	X	X	X	
	razorbill	X	X	X	
	puffin	X	X	X	
East Caithness Cliffs	guillemot	X	X	X	
	puffin	X	X	X	
Hoy	guillemot	X			
	puffin	X	X	X	
	Great skua		X	X	
	Arctic skua	X	X	X	
Copinsay	guillemot	X			
Marwick Head	guillemot	X			
Rousay	guillemot	X			
Sule Skerry and Sule Stack	gannet	X			
Hermaness, Saxa Vord and Valla Field	gannet	X			
Fair Isle	gannet	X			
North Rona and Sula Sgeir SPA	Gannet	X			
Noss	gannet	X			X



### MeyGen Tidal Array

Consent was granted for this tidal array, located within the Inner Sound, Pentland Firth, in September 2013. Although consent is for a 61 turbine, 86 MW array, the first phase is limited to a maximum of 6 turbines through conditions attached to the consent. The [Meygen AA](#) concluded that the MeyGen development would not adversely affect site integrity of any SPA as impacts from displacement and disturbance during construction were considered to be minimal. For some species collision risk with the tidal turbines was identified as a theoretical issue; however the limit of the first phase to 6 turbines mitigates this.

### Beatrice Offshore Windfarm Limited (BOWL) and Moray Offshore Renewables Limited (MORL) Offshore Wind Farms

Located in the outer Moray Firth, consent was granted for these wind farms in March 2014. The BOWL consent was for up to 140 wind turbine generators (WTGs) and the MORL development (which comprises 3 separate wind farms) was for up to a total of 186 WTGs. The main effects on puffin, guillemot and razorbill from these wind farm developments was from the potential for displacement. Effects assessed within the [BOWL AA](#) and [MORL AA](#) were found to be within identified thresholds for the North Caithness Cliffs, East Caithness Cliffs and Hoy SPAs. Potential effects on Arctic skua from the Hoy SPA were considered to be minimal.

### European Offshore Wind Deployment Centre (EOWDC)

Located in Aberdeen Bay, consent was granted in March 2013 for 11 WTGs. In the [EOWDC AA](#) LSE was identified on gannet from Noss SPA. Effects were from potential collision, however, only 17 gannet were predicted to collide with the turbines and it was concluded that it was likely that most of these would come from the Troup, Pennan and Lion's Head SPA, of which gannet is not a qualifying feature.

MS-LOT are not aware of any terrestrially-based projects which may impact upon the SPAs / SACs identified, and therefore there are no terrestrially based projects included in the in-combination assessment.

Table 6. below provides a summary of the predicted impacts and thresholds for the species and sites where in-combination effects have been identified. Different methods were used within the BOWL and MORL AAs to identify thresholds: Potential Biological Removal (PBR) and Population Viability Analysis & Acceptable Biological Change (PVA / ABC). It should be noted that the figures and thresholds used below are the result of agreement and knowledge at the time of the individual development assessments. These tables allow for a semi-quantitative consideration of in-combination assessment. The assessment is precautionary as the impacts predicted from the Fall of Warness have not been apportioned to the different SPAs, rather all estimated collisions are assigned to each of the SPAs.

Table 6. In-combination Assessment

<b>Guillemot</b>					
Impact pathway = Displacement or collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)					
Abundance estimates have been used where collision risk figures are either unavailable or not comparable.					
Name of SPA	MeyGen (ES)	BOWL (MSLOT AA)	MORL (MSLOT AA)	FoW (98 % avoidance rate) (SNH-led EA)	CIA conclusion
<b>Copinsay SPA</b> (29, 450 Individuals)	CRM not done as figures on site sufficiently low that risk not considered further.	-	-	6.9	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.
<b>East Caithness Cliffs SPA</b> (106, 700 individuals)		Threshold (PBR) = 563-1689 breeding adults killed pa  Predicted effect = 3448 displaced		6.9	No AESI – CR considered unlikely for MeyGen due to such low numbers recorded on site. Mortality estimates for MORL/BOWL considered to be within acceptable limits and are not pushed beyond this when considered cumulatively with FoW.
<b>Hoy SPA</b> (13, 400 pairs)	Apportioning not necessary.	-	-	6.9	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.
<b>Marwick Head SPA</b> (37, 700 individuals)	peak site abundance for phase 1= 27 individuals	-	-	6.9	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.
<b>North Caithness Cliffs SPA</b> (38, 300 individuals)	peak abundance for survey area = 327 individuals	Threshold (PBR) = 248-745 breeding adults killed pa  Predicted effect = 332 displaced		6.9	No AESI – CR considered unlikely for MeyGen due to such low numbers recorded on site. Mortality estimates for MORL/BOWL considered to be within acceptable limits and are not pushed beyond this when considered cumulatively with FoW.
<b>Rousay SPA</b> (10, 600 individuals)		-	-	6.9	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.

## Puffin

Impact pathway = Displacement or collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)

Abundance estimates have been used where collision risk figures are either unavailable or not comparable.

Name of SPA	MeyGen (ES - A742756 - page 59, section 6.130-6.132 A742822)	BOWL (MSLOT AA)	MORL (MSLOT AA)	FoW (98% avoidance rate) (SNH-led EA)	CIA conclusion
<b>East Caithness Cliffs SPA</b> 7325 pairs (joint with NCC)	CRM not done as figures on site sufficiently low that risk not considered further.  Apportioning not necessary.	Threshold (PBR) = 7-13  Threshold (PVA/ABC) = ~ 50 pairs and 140 individuals		0.5	No AESI – CR considered unlikely for MeyGen due to such low numbers recorded on site. Mortality estimates for MORL/BOWL considered to be within acceptable limits and are not pushed beyond this when considered cumulatively with FoW.
<b>North Caithness Cliffs SPA</b> 7325 pairs (joint with ECC)	peak site abundance for phase 1= 14 individuals  peak abundance for survey area = 171 individuals	Threshold (PBR) = 205 – 341  Threshold (PVA/ABC) = ~ 850 pairs and > 2000 individual  <b>Combined NCC and ECC (as advised as most appropriate to use in the assessment)</b> Threshold (PBR) = 212-345 mortalities Threshold (PVA/ABC) = between 900 pairs and >2140 individuals failing to breed  Predicted effect = 562 individuals displace converted to 159 adult mortalities		0.5	No AESI – CR considered unlikely for MeyGen due to such low numbers recorded on site. Mortality estimates for MORL/BOWL considered to be within acceptable limits and are not pushed beyond this when considered cumulatively with FoW.
<b>Hoy SPA</b> (350 pairs)		Threshold (PBR) = 4-12 adult mortalities  Predicted effect = 13 birds displaced		0.5	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.

### Razorbill

Impact pathway = Displacement or collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)

Abundance estimates have been used where collision risk figures are either unavailable or not comparable.

Name of SPA	MeyGen (ES - 3.11 from A742822)	BOWL (MSLOT AA)	MORL (MSLOT AA)	FoW (98% avoidance rate) (SNH-led EA)	CIA conclusion
<b>North Caithness Cliffs SPA (4000 individuals – data form figure)</b>	CRM not done as figures on site sufficiently low that risk not considered further.  Apportioning not necessary.  peak site abundance for phase 1= 9 individuals  peak abundance for survey area = 109 individuals	Threshold (PBR) = 15 – 46 adult mortalities  Predicted effect = 22 birds displaced		0.1	No AESI – CR considered unlikely for MeyGen due to such low numbers recorded on site. Mortality estimates for MORL/BOWL considered to be within acceptable limits and are not pushed beyond this when considered cumulatively with FoW.

### Gannet

Impact pathway = Collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)

Abundance estimates have been used where collision risk figures are either unavailable or not comparable.

Name of SPA	MeyGen (ES)	FoW (98% avoidance rate) (SNH-led EA)	CIA conclusion
<b>Fair Isle (1166 pairs)</b>	CRM not done as figures on site sufficiently low that risk not considered further.  Apportioning not necessary.  peak site abundance for phase 1= 1 individuals	0.0	No AESI – mortality from collision risk considered to be unlikely or very low for each development, both individually and combined.
<b>Hermaness, Saxa Vord and Valla Field SPA (16400 pairs)</b>		0.0	
<b>North Rona and Sula Sgeir SPA (10400 pairs)</b>		0.0	
<b>Noss SPA (6860 pairs)</b>		0.0	
<b>Sule Skerry and Sule Stack SPA (5900 pairs)</b>		0.0	

	peak abundance for survey area = 13 individuals		
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### Arctic skua

Impact pathway = Displacement or collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)

Abundance estimates have been used where collision risk figures are either unavailable or not comparable.

Name of SPA	MeyGen (ES)	BOWL (ES)	MORL (ES)	FoW (SNH-led EA)	CIA conclusion
Hoy SPA (59 pairs)	8 birds recorded – no abundance estimates calculated or CRM carried out.	CRM = 6	28 birds recorded – none recorded at potential collision risk height.	Potential for displacement, however species not recorded by monitoring (as only focuses on diving birds) – rather was included as a precaution.	No AESI - mortality from collision risk considered to be unlikely or very low for each development, both individually and combined for all development. FoW not considered to be of prime habitat for Arctic skua therefore displacement when assessed cumulatively with CR not considered to change the No AESI conclusion in anyway.

### Great skua

Impact pathway = Displacement or collision leading to mortality (units = breeding adult mortalities per year unless stated otherwise)

Abundance estimates have been used where collision risk figures are either unavailable or not comparable.

Name of SPA	BOWL (ES)	MORL (ES)	FoW (SNH-led EA)	CIA conclusion
Hoy SPA (1900 pairs)	CRM = 13	110 birds recorded – 1 at potential collision risk height.	Potential for displacement, however species not recorded by monitoring (as only focuses on diving birds) – rather was included as a precaution.	No AESI - mortality from collision risk considered to be unlikely or very low for each development, both individually and combined for all developments. FoW not considered to be of prime habitat for Great skua therefore displacement when assessed cumulatively with CR not considered to change the No AESI conclusion in anyway.

It should be noted that the figures and thresholds used above are the result of

agreement and knowledge at the time of their individual development assessments, this is because what constitutes the best available evidence and assessment methods is a fast moving area.

Developments in the pre-application phase

Before determinations are made on future projects (e.g. Brims, Lashay Sound and Westray South Tidal developments any AA required will need to include an in-combination assessment that accounts for the Fall of Warness and other developments already consented.

**Conclusion**

Having considered the appraisal completed by SNH / EMEC and advice provided by MSS, MS-LOT conclude that the installation and operation of devices at the Fall of Warness tidal test site will not adversely affect the integrity of any SPAs or SACs detailed in section 1a either alone or in combination with the MeyGen, BOWL, MORL and EOWDC developments if the devices are within the design envelope detailed in section 2d of this document and as long as conditions in any associated marine licence are complied with.

**References**

Malcolm, I.A., Godfrey, J.D. & Youngson, A.F. 2010. Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland’s coastal environment: implications for the development of marine renewables. Scottish Marine and Freshwater Science. 1, 14: 1-72. Available at <http://www.gov.scot/resource/doc/295194/0111162.pdf>

Godfrey, J.D., Stewart, D.C., Middlemas, S.J. & Armstrong, J.D. 2014. Depth use and migratory behaviour of homing Atlantic salmon (*Salmo salar*) in Scottish coastal waters. ICES Journal of Marine Science; doi:10.1093/icesjms/fsu118.

Godfrey, J.D., Stewart, D.C., Middlemas, S.J. & Armstrong, J.D. 2014. Depth use and movements of homing Atlantic salmon (*Salmo salar*) in Scottish coastal waters in relation to marine renewable energy development. Scottish Marine and Freshwater Science Volume 5 Number 18. Available at <http://www.gov.scot/Resource/0046/00466487.pdf>

**3d. Conditions required.**

Condition:	Reason:
<p><b>NB – Conditions will be placed on individual marine licences for all projects at the FoW as follows:</b></p>	
<p>Requirement for Project Environmental Monitoring Programmes (PEMPs).</p>	<p>To ensure suitable monitoring of impacts to seals and birds at the FoW.</p>
<p><u>SAC</u></p>	

<p>Use of the Marine Mammal Observer Protocol with the inclusion of seals, ensuring as far as reasonably possible that seals are not present in the area, immediately prior to the start of drilling operations or other particularly 'noisy' marine works.</p> <p>Exclusion of installation and maintenance vessels from the vicinity of haul-outs, particularly during the breeding season. This may be achieved by adherence to the guidelines associated with the Scottish Marine Wildlife Watching Code (SMWWC; <a href="http://www.marinecode.org">www.marinecode.org</a>) during all vessel-based activities.</p> <p>Any conditions required arising from project-specific appraisals, for impacts relating to underwater noise leading to disturbance.</p> <p><u>SPA</u></p> <p>No conditions required for HRA purposes however recommendations for monitoring and or mitigation to be incorporated into the PEMP.</p> <p>Other conditions as required on the marine licences of individual developers.</p>	<p>To minimise the potential for behavioural disturbance or injuries during the noisiest activities and use of vessels.</p>
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<b>Name of assessor</b>	Robert Main
<b>Date</b>	17/10/2014
<b>Name of approver</b>	Gayle Holland
<b>Date</b>	01/12/2015