aquatera
environmental services and products

Array deployment of Seatricity's Oceanus wave energy converter at EMEC's wave test site in Orkney

Report to inform Habitats Regulations Appraisal

Report to Seatricity

Issued by Aquatera Ltd

P380 – February 2012

www.aquatera.co.uk

This study was completed for:

Seatricity
Stourside Place
Station Road
Ashford
Kent
TN23 1PP

Contact: Bob Tillotson
Tel: 01233 652 761
Email: enquiries@seatricity.net

This study was completed by:

Aquatera Ltd
Stromness Business Centre
Stromness
Orkney
KW16 3AW

Contact: Ian Hutchison
Tel: 01856 850 088
Fax: 01856 850 089
Email: ian.hutchison@aquatera.co.uk

Revision record

Revision Number	Issue Date	Revision Details
0.1-0.9	n/a	Internal drafts
1.0	03/02/12	Draft for issue to EMEC
2.0	29/02/12	Final draft for issue to Marine Scotland

Contents

List of Figures

List of Tables

1 Introduction

European Directives and supporting UK and Scottish Regulations have afforded special protection to a number of habitats and species that are considered to be of prime importance for conservation. A key component of this strategy is the establishment of a network of sites which hold representatives of many of these habitats and species. This is known as the Natura Network.

Under the regulations regarding this network, there is a requirement for the Competent Authority (Marine Scotland in this instance) to consider the potential effects of any proposed plan or project upon the primary and qualifying features of Natura Sites as well as the relevant conservation objectives. This is achieved by undertaking a Habitats Regulations Appraisal (HRA) which consists of the following tasks:

Task 1. The identification of possible Natura Sites that could be affected by a proposed plan/project and the relevant qualifying features within these sites

Task 2. A test of Likely Significant Effect (LSE) on primary and qualifying features as well as the relevant conservation objectives

Task 3. An Appropriate Assessment (where it is anticipated that LSE is possible)

The purpose of this report is to provide Marine Scotland and Scottish Natural Heritage (SNH) with sufficient information to undertake the tasks listed above. The following tasks were undertaken:

- Identification of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) which could possibly be affected by the proposals, i.e. have 'connectivity' with the proposals
- An assessment of the potential effects on the relevant qualifying features and site integrity based on data gathered from the European Marine Energy Centre's (EMEC's) on-going wildlife monitoring programme and site citation information

This report should be read in parallel with the following supporting information:

Aquatera (2011) Deployment of Seatricity's wave energy converter array at EMEC's wave test site at Billia Croo in Orkney: Environmental and Navigational Scoping Information

Aquatera (2012) Deployment of Seatricity's wave energy converter at EMEC's wave test facility in Orkney: Environmental Appraisal

2 Special Protection Areas (SPAs)

2.1 Identification of SPAs with potential connectivity to the proposals

The purpose of this section is to define a 'long list' of SPAs which could possibly be affected by the proposals, i.e. those with connectivity to the proposed deployment. Following recent consultation with SNH, it was decided that this initial long list should be comprehensive so as to ensure that all sites which may be affected were considered at the initial stages of the HRA.

Aquatera has developed a tool for defining this long list that uses foraging ranges, along with the information and data provided within the SPA citations, to establish which SPAs and qualifying interests may be affected by the proposed development.

The following potential impacts on birds were identified during the Scoping Process:

- Collision risk to diving birds from actuating floats/mooring lines
- Disturbance or displacement of birds from presence of devices

This is supported by SNH's Scoping Response dated 6th December 2011 (CNS/REN/WAVE/Seatricity/CDP107697).

The following information was collated for each SPA and is provided in Appendix A:

- Site name
- Minimum distance of the SPA boundary from the proposed deployment location
- Qualifying features[1]
  - during the breeding season
  - outwith the breeding season
- Mean – maximum (mean-max) foraging buffer distance (refer to Appendix A) [2]
- Maximum and mean-max foraging depth[3] (refer to Appendix A)

The Birdlife International database was used as far as possible to define the foraging ranges and foraging depths of the qualifying features of the SPAs in Scotland (refer to Appendix A). No data were available for European storm petrel, Leach's storm petrel, herring gull and great black-backed gull therefore; the ABPmer report (ABPmer, 2010) was referenced for indicative foraging ranges for these species. The foraging ranges used during the assessment were rounded up to the nearest 5 km to avoid omitting SPAs with qualifying features with foraging ranges just outwith the proposed deployment location. The foraging ranges used in the assessment are provided in Appendix A of this report.

Using this information, the following SPAs were identified as being those that could theoretically be affected by the proposed deployment. This was based on an overlap of the mean-max foraging ranges of the qualifying species with the proposed development site (SPAs are also shown in Figure 2.1):

[1] http://gateway.snh.gov.uk/sitelink/

[2] http://seabird.wikispaces.com/

[3] http://seabird.wikispaces.com/

- Auskerry SPA
- Buchan Ness to Collieston Coast SPA
- Calf of Eday SPA
- Cape Wrath SPA
- Copinsay SPA
- East Caithness Cliffs SPA
- Fair Isle SPA
- Fetlar SPA
- Flannan Isles SPA
- Foula SPA
- Fowlsheugh SPA
- Handa 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
- Rousay SPA
- Sule Skerry and Sule Stack SPA
- Sumburgh Head SPA
- The Shiant Isles SPA
- Troup, Pennan and Lion`s Heads SPA
- West Westray SPA

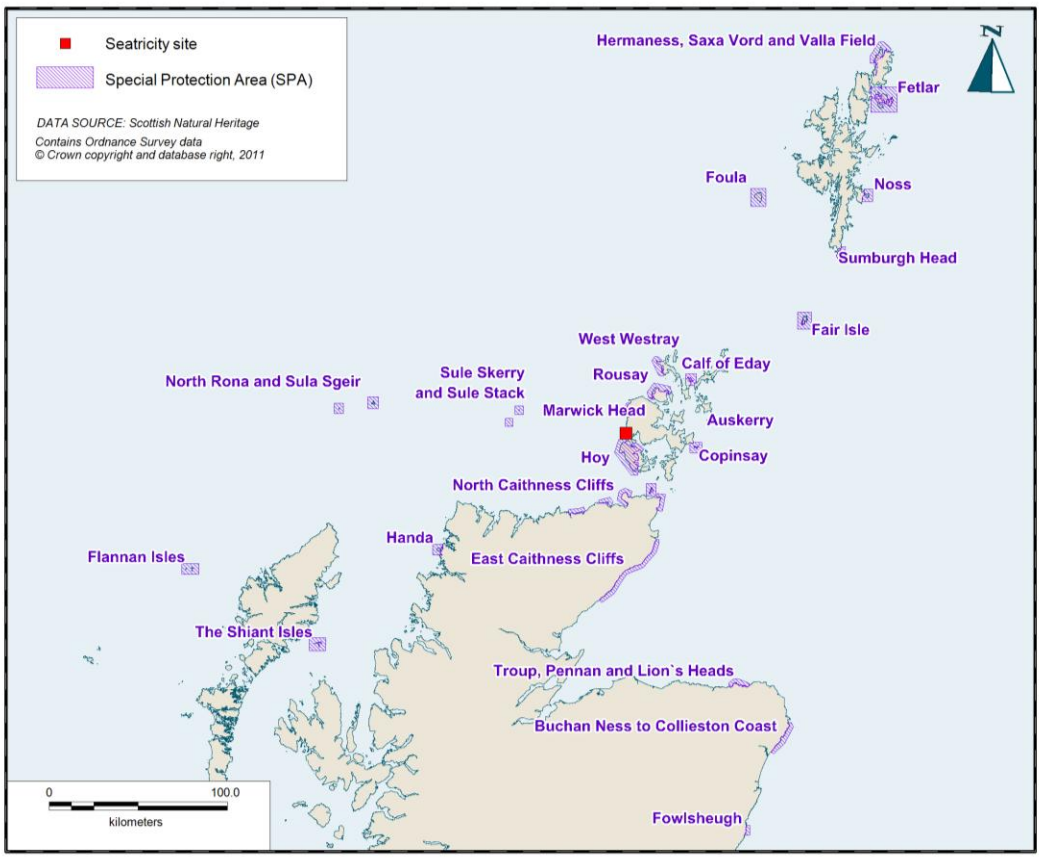

Figure 2.1 SPAs with potential connectivity to the proposals

The complete results of this assessment are presented in Appendix A. The qualifying features of each site with which there is a potential connection are also identified, i.e. those with a foraging range which overlaps the deployment area.

2.2 Assessment of the potential effects on SPAs with possible connectivity

For each of the SPAs identified and the relevant qualifying features, the level of effect of any potential impacts was considered. In order to consider the potential significance of the effects on each relevant qualifying feature, it was necessary to establish the importance of the test site for these species. Data from EMEC's ongoing wildlife monitoring programme was used in an attempt to determine the average number of birds recorded across the test site per observation over a one year period from April 2009 to March 2010.

The EMEC data includes records of the dates on which surveys were carried out, records of species sightings, the time they were sighted and the number of individuals recorded at that observation time. The results in Table 2.1 and Table 2.2 were calculated for each species by dividing the total number of individuals recorded within a given month by the number of observation periods. The observation periods were taken as single survey shifts, i.e. the number of periods in a month where the observers had recorded starting a survey followed by finishing a survey in a single shift. There were however, a number of difficulties in interpreting the data for the purposes of this assessment as outlined below.

On examining the long hand notes made by surveyors for each survey period, it can be seen that each survey period contains sweeps of the inner, middle and outer zones of the wave test site. There is no structure to the pattern of surveying, i.e. starting with a sweep of the inner section, followed by the mid, followed by the outer. It does however appear that the surveyors always attempted to sweep all three bands before repeating a band, but the order changes from observation to observation. Also if the allotted survey time expires before either an individual sweep is completed, or before a full suite of the three sweeps is completed, the sweep is either left unfinished or continued some hours or even days later.

This means in terms of survey effort that a single observation period may contain much more than one full sweep of the study area. Therefore it is conceivable that the effort periods are greater than used in the Table 2.1.

Additionally, as sweeps were not always fully completed and sometimes large breaks were seen prior to the completion of individual sweeps, the possibility of double counting cannot be ruled out. Therefore, for the purpose of this report, the results shown in Table 2.1 and Table 2.2 are considered to be worst-case scenarios.

Table 2.1 Average number of birds recorded across the test site per observation (EMEC, 2009-2010)[4]

SPECIES	Average number of birds per observation											
	APR 09	MAY 09	JUN 09	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 10	FEB 10	MAR 10
Arctic skua	0.00	0.23	0.00	0.38	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arctic tern	0.00	55.82	6.33	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auk sp	9.46	152.14	51.92	80.04	0.86	0.22	0.92	0.94	0.14	0.81	1.59	1.10
Black Guillemot	11.27	6.05	6.67	4.92	2.18	0.11	0.54	1.06	0.19	0.88	10.59	11.00
Common gull	0.00	0.05	0.08	0.23	0.00	0.00	2.92	32.31	2.29	0.31	0.35	0.10
Common scoter	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00
cormorant	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eider	1.88	0.95	0.00	0.62	2.09	0.56	1.77	8.00	5.62	8.56	16.29	7.80
Fulmar	357.08	425.27	137.79	894.19	326.73	259.17	470.54	642.94	498.38	198.50	64.12	314.70
Gannet	6.15	5.82	12.42	42.08	72.95	75.61	139.46	144.25	8.71	5.75	0.00	0.10
Great black-backed gull	3.04	0.82	9.29	3.58	3.68	1.22	6.31	11.81	8.29	3.56	3.76	2.50
Great northern diver	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.06	0.19	0.31	0.00	0.00
Great skua	1.54	3.59	7.50	10.50	10.50	2.39	3.46	2.81	0.05	0.00	0.00	0.00
Grey Phalarope	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Greylag goose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94	0.06	0.00
Guillemot	14.65	89.77	81.83	59.62	0.09	0.61	2.31	2.44	0.38	10.13	16.94	12.90
Gull sp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	12.29	0.75	0.00	0.00
Herring gull	3.54	1.41	0.17	0.15	0.00	0.00	2.92	7.56	1.52	0.31	0.65	0.90
Kittiwake	15.23	85.91	10.21	24.54	0.55	0.33	0.62	0.63	1.86	0.19	0.06	0.00
Lesser black backed gull	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Little auk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00
Long tailed duck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00
Manx shearwater	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pomarine skua	0.00	0.00	0.00	0.00	0.00	0.06	0.08	0.06	0.00	0.00	0.00	0.00
Puffin	1.73	4.36	3.25	5.69	0.05	0.00	0.00	0.00	0.00	0.00	0.12	0.10
Razorbill	2.62	5.77	0.96	0.92	0.00	0.00	0.00	0.06	0.00	0.00	0.41	0.20
Red throated diver	0.38	0.09	0.21	0.12	0.09	0.00	0.15	0.13	0.43	0.31	0.12	0.10
Scaup	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80
Shag	23.31	11.23	35.63	95.77	66.95	133.11	347.54	335.25	279.24	327.00	94.35	68.40
Storm petrel	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Swan sp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	0.00	0.00	0.00
Unidentified auk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wigeon	0.00	0.00	0.00	0.00	0.00	0.00	13.08	10.63	0.00	0.00	0.29	0.00

This indicative information was then used along with the data from the relevant SPA citations to establish the potential importance of the test site for each qualifying feature. This information is presented within Table 2.2. Please note that only those qualifying features for which a potential impact/connection was identified during the previous task are included in Table 2.2, for all other qualifying features which were screened out of the assessment during the previous task, please refer to Appendix A. All qualifying features were considered in the initial assessment.

[4] Please note the highest average number of each species recorded per observation across the test site is highlighted in green for each species in Table 2.1

Table 2.2 Assessment of the potential level of effect on relevant SPA qualifying features that may be present at the Billia Croo test site

Site	Qualifying Feature	Foraging buffer distance (km)	Distance from site (km)	Relevant season	Highest average monthly maximum per observation [5]	SPA citation population listing	Potential % of SPA population
Auskerry SPA	Storm Petrel	105	44.75	Breeding	0.05	3600 pairs	0.0006
Buchan Ness to Collieston Coast SPA	Seabird assemblage	N/A	188.83	Breeding	N/A	95000 individuals	N/A
	Fulmar	315	188.83	Breeding	894.19	1765 pairs	25.3
Calf of Eday SPA	Seabird assemblage	N/A	43.70	Breeding	N/A	30000 individuals	N/A
	Great black-backed gull	45	43.70	Breeding	11.81	938 pairs	0.6
	Guillemot	65	43.70	Breeding	89.77	12645 individuals	4.8
	Kittiwake	70	43.70	Breeding	85.91	1717 pairs	2.5
	Fulmar	315	43.70	Breeding	894.19	1955 pairs	22.9
Cape Wrath SPA	Seabird assemblage	N/A	89.99	Breeding	N/A	50000 individuals	N/A
	Fulmar	315	89.99	Breeding	894.19	2300 pairs	19.4
Copinsay SPA	Seabird assemblage	N/A	35.29	Breeding	N/A	70000 individuals	N/A
	Great black-backed gull	45	35.29	Breeding	11.81	490 pairs	1.2
	Guillemot	65	35.29	Breeding	89.77	29450 individuals	0.3
	Kittiwake	70	35.29	Breeding	85.91	9550 pairs	0.4
	Fulmar	315	35.29	Breeding	894.19	1615 pairs	27.7
East Caithness Cliffs SPA	Seabird assemblage	N/A	61.69	Breeding	N/A	300000 individuals	N/A
	Guillemot	65	61.69	Breeding	89.77	106700 individuals	0.08
	Kittiwake	70	61.69	Breeding	85.91	32500 pairs	0.1

[5] Please note the maximum average number observed across the test site is highlighted in green for each species in Table 2.1.

Site	Qualifying Feature	Foraging buffer distance (km)	Distance from site (km)	Relevant season	Highest average monthly maximum per observation [5]	SPA citation population listing	Potential % of SPA population
	Fulmar	315	61.69	Breeding	894.19	15000 pairs	3
	Puffin	65	61.69	Breeding	5.69	1750 pairs	0.2
Fair Isle SPA	Seabird assemblage	N/A	110.33	Breeding	N/A	180000 individuals	N/A
	Fulmar	315	110.33	Breeding	894.19	35210 pairs	1.3
	Gannet	310	110.33	Breeding	144.25	1166 pairs	6.2
Fetlar SPA	Seabird assemblage	N/A	219.34	Breeding	N/A	22000 individuals	N/A
	Fulmar	315	219.34	Breeding	894.19	9500 pairs	4.7
Flannan Isles SPA	Seabird assemblage	N/A	250.28	Breeding	N/A	50000 individuals	N/A
	Fulmar	315	250.28	Breeding	894.19	4730 pairs	9.5
Foula SPA	Seabird assemblage	N/A	141.57	Breeding	N/A	250000 individuals	N/A
	Fulmar	315	141.57	Breeding	894.19	46800 pairs	1
Fowlsheugh SPA	Seabird assemblage	N/A	235.03	Breeding	N/A	145000 individuals	N/A
	Fulmar	315	235.03	Breeding	894.19	1170 pairs	38.2
Handa SPA	Seabird assemblage	N/A	118.82	Breeding	N/A	200000 individuals	N/A
	Fulmar	315	118.82	Breeding	894.19	3500 pairs	12.8
Hermaness, Saxa Vord and Valla Field SPA	Seabird assemblage	N/A	236.46	Breeding	N/A	157500 individuals	N/A
	Fulmar	315	236.46	Breeding	894.19	19539 pairs	2.3
	Gannet	310	236.46	Breeding	144.25	16400 pairs	0.4
Hoy SPA	Seabird assemblage	N/A	339.26	Breeding	N/A	120000 individuals	N/A
	Great skua	45	1.84	Breeding	10.50	1900 pairs	0.3
	Great black-backed gull	45	1.84	Breeding	11.81	570 pairs	1
	Guillemot	65	1.84	Breeding	89.77	13400 pairs	0.3
	Kittiwake	70	1.84	Breeding	85.91	3000 pairs	1.4
	Arctic skua	45	1.84	Breeding	0.64	59 pairs	0.5

Site	Qualifying Feature	Foraging buffer distance (km)	Distance from site (km)	Relevant season	Highest average monthly maximum per observation [5]	SPA citation population listing	Potential % of SPA population
	Fulmar	315	1.84	Breeding	894.19	35000 pairs	1.3
	Puffin	65	1.84	Breeding	5.69	3500 pairs	0.08
	Red-throated diver	15	1.84	Breeding	0.43	58 individuals	0.7
Marwick Head SPA	Seabird assemblage	N/A	13.15	Breeding	N/A	75000 individuals	N/A
	Guillemot	65	13.15	Breeding	89.77	37700 individuals	0.2
	Kittiwake	70	13.15	Breeding	85.91	7700 pairs	0.6
North Caithness Cliffs SPA	Seabird assemblage	N/A	29.85	Breeding	N/A	110000 individuals	N/A
	Guillemot	65	29.85	Breeding	89.77	38300 individuals	0.2
	Kittiwake	70	29.85	Breeding	85.91	13100 pairs	0.3
	Fulmar	315	29.85	Breeding	894.19	14700 pairs	3
	Puffin	65	29.85	Breeding	5.69	1750 pairs	0.2
	Razorbill	35	29.85	Breeding	5.77	4000 individuals	0.1
North Rona and Sula Sgeir SPA	Seabird assemblage	N/A	137.40	Breeding	N/A	130000 individuals	N/A
	Fulmar	315	137.40	Breeding	894.19	11500 pairs	3.9
	Gannet	310	137.40	Breeding	144.25	10400 pairs	0.7
Noss SPA	Seabird assemblage	N/A	180.69	Breeding	N/A	35000 individuals	N/A
	Fulmar	315	180.69	Breeding	894.19	6350 pairs	7
	Gannet	310	180.69	Breeding	144.25	6860 pairs	1.1
Rousay SPA	Seabird assemblage	N/A	22.85	Breeding	N/A	30000 individuals	N/A
	Guillemot	65	22.85	Breeding	89.77	10600 individuals	0.8
	Kittiwake	70	22.85	Breeding	85.91	4900 pairs	0.9
	Arctic skua	45	22.85	Breeding	0.64	130 pairs	0.2
	Fulmar	315	22.85	Breeding	894.19	1240 pairs	36.1
Sule Skerry and	Seabird assemblage	N/A	57.11	Breeding	N/A	100000 individuals	N/A

Site	Qualifying Feature	Foraging buffer distance (km)	Distance from site (km)	Relevant season	Highest average monthly maximum per observation [5]	SPA citation population listing	Potential % of SPA population
Sule Stack SPA	Guillemot	65	57.11	Breeding	89.77	6298 pairs	0.7
	Leach's petrel	105	57.11	Breeding	N/A	5 pairs	None
	Gannet	310	57.11	Breeding	144.25	5900 pairs	1.2
	Puffin	65	57.11	Breeding	5.69	46900 pairs	0.006
	Storm Petrel	105	57.11	Breeding	0.05	500 pairs	0.005
Sumburgh Head SPA	Seabird assemblage	N/A	23.58	Breeding	N/A	35000 individuals	N/A
	Fulmar	315	149.92	Breeding	894.19	2542 pairs	17.6
The Shiant Isles SPA	Seabird assemblage	N/A	204.40	Breeding	N/A	200000 individuals	N/A
	Fulmar	315	204.40	Breeding	894.19	6820 pairs	6.6
Troup, Pennan and Lion`s Heads SPA	Seabird assemblage	N/A	151.91	Breeding	N/A	150000 individuals	N/A
	Fulmar	315	151.91	Breeding	894.19	4400 pairs	10.2
West Westray SPA	Seabird assemblage	N/A	36.34	Breeding	N/A	113000 individuals	N/A
	Guillemot	65	36.34	Breeding	89.77	42150 individuals	0.2
	Kittiwake	70	36.34	Breeding	85.91	23900 pairs	0.2
	Arctic skua	45	36.34	Breeding	0.64	78 pairs	0.02
	Fulmar	315	36.34	Breeding	894.19	1400 pairs	31.9

Please note that the results presented in Table 2.2 are based on the precautionary assumption that all individuals observed on site originate from a single SPA. This assumption is applied to the calculations for each SPA and therefore represents a worst case scenario. This approach was deemed sufficient due to the low number of birds observed across the site; particularly in comparison to the cited SPA populations.

As can be seen from Table 2.2, only the following species were recorded in numbers greater than 1% of any SPA cited population:

- Fulmar
- Gannet
- Great black-backed gull
- Kittiwake

As stated previously, due to the quality of the data, these results are considered to be worst-case scenarios.

As a test of the data, the month of July was investigated in greater detail for fulmar (the month in which the highest numbers had been recorded). Results from surveys where only continuous full sweeps of the whole site were undertaken, showed the average number per observation to be 338.31, less than half the number of 894.19 if the results from all surveys are included i.e. those which did not record a full sweep. It is therefore highly likely, that the numbers used in this stage of the assessment are high.

Regardless of the numbers recorded on site, it is important to assess the potential impacts on the species that have been observed at the test site in relatively high numbers; fulmar, gannet, great black-backed gull and kittiwake.

The environmental appraisal (Aquatera, 2012) identified two potential impacts relating to birds:

- Collision risk to diving birds from actuating floats/mooring lines
- Disturbance or displacement of birds from presence of devices

2.2.2 Collision risk to diving birds from actuating floats/mooring lines

Of the four species observed at the test site in relatively high numbers, the only diving species is gannet; the other three species are all surface feeders, with no potential for collision.

There is limited knowledge of the behaviour of seabirds in the vicinity of renewable energy devices. The floats will normally be on the sea surface (except in high sea states) and will remain uncoated or be fitted with high-visibility reflective strips. Within the water column, main mooring lines will be taught but chains interconnecting actuating floats and supplementary mooring lines will be under less tension.

It is possible that birds may avoid the area altogether due to the visual presence of the actuating floats. It is also possible; however, that birds will be attracted to the devices if there are aggregations of fish, in particular, prey species, present.

The floats themselves are not considered to present any collision risk to diving birds. It is possible that if unable to detect submerged components or take avoidance action, diving birds could collide with submerged structures such as interconnecting chains and mooring lines, which could potentially result in injury or death.

The risk of collision is considered greatest for plunge divers, in particular, gannet, as it is unknown whether this species would be able to detect and avoid submerged mooring lines or

chains when diving at speed from heights of up to 40 m. Gannets dive to depths between 8 – 15 m, but commonly 1 – 4 m, however they have been recorded diving as deep as 30 m (Birdlife International[6]).

The actual collision risk for gannet is unknown, however, on a proportionate area basis the chains associated with the three device rings will take up 300 m^2 of sea area, amounting to only 0.005% of the 611ha EMEC test site. Given the relative scale of the proposed deployment area and the size and character of the structural components with which collision could theoretically occur, it is considered that risk of collision to gannet is very low.

2.2.3 Disturbance or displacement of birds from presence of devices

The presence of an array of actuating floats with high visibility reflective strips on the sea surface could cause displacement of birds from the area for the duration of the operational phase. However, individually, the devices are small in size, similar to other structures (e.g. buoys), which seabirds do not appear to avoid and the arrangement of the array means that there is ample space around the devices for foraging or resting seabirds. Therefore, it seems unlikely that birds would avoid the arrays to any great extent. In a worst-case scenario, however, all birds could potentially be displaced outwith the approximate 2.36ha footprint of the three arrays. It seems very unlikely that if displacement occurred, it would extend very far beyond the actual arrays. As seabirds normally forage in different locations depending on prey availability, displacement from an area of this size would not be outside the normal range of daily variation. Therefore, the magnitude of this impact is considered to be very low, and the resulting impact classification is minor. This level of impact is described in EMEC's EIA Guidance for Developers (2011[7]), produced in conjunction with SNH, as "changes in habitats or species which could be measured, but of a scale unimportant relative to natural variability".

2.3 Potential implications of the proposed deployment on SPAs – conclusions

As shown in Table 2.2, the numbers of birds observed across the whole test site are very low for most species. For those species recorded in relatively high numbers, the potential risks are deemed to be so low that it is concluded that any effects arising from the proposals will be so minimal as to not result in any significant effect on site integrity of the SPAs identified.

It is therefore recommended, that no further assessment of the implications of the proposed development on these SPAs with regards to the conservation objectives is required.

[6] http://seabird.wikispaces.com/

[7] Guidance for Developers at EMEC Grid-connected Sites: Supporting Environmental Documentation

3 Special Areas of Conservation (SACs)

The purpose of this section is to define a 'long list' of SACs which could possibly be affected by the proposals, i.e. those with connectivity to the proposed deployment. Following recent consultation with SNH it was decided that this initial long list should be comprehensive so as to ensure that all sites which may be affected were considered at the initial stages of the HRA.

3.1 Identification of SACs with potential connectivity to the proposals

The proposed development does not overlap with the boundaries of any SAC. Therefore, only those SACs with mobile qualifying features which may be present within and utilise the proposed deployment area are considered within this assessment. SNH advised in its scoping advice dated 6th December 2011 (CNS/REN/WAVE/Seatricity/CDP107697) that Seatricity should consider three SACs in relation to its proposed development due to potential for Likely Significant Effect (LSE):

- Faray and Holm of Faray SAC designated for grey seals
- North Rona SAC designated for grey seals
- Sanday SAC designated for harbour seals

The locations of these SACs with respect to the proposed deployment location are shown in Figure 3.1.

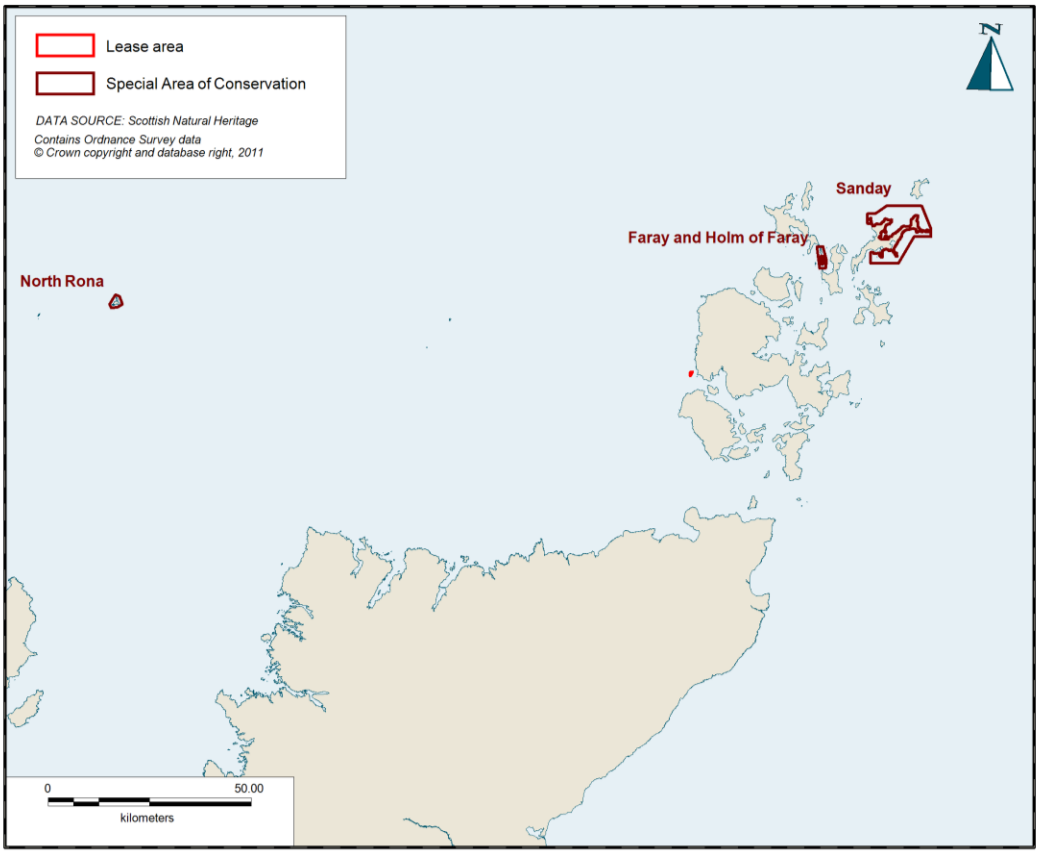

Figure 3.1 SACs relevant to the proposed development

3.2 Assessment of the potential level of effect on SACs with possible connectivity

For each of the SACs identified and the relevant qualifying features, the LSE of any potential impacts was considered. In order to consider the potential significance of the effects on relevant each qualifying feature, it was necessary to establish the importance of the test site for these species.

Data from EMEC's ongoing wildlife monitoring programme was used to generate the average number of each species observed per month from 2009-2010. These data are presented in Table 3.1 below:

Table 3.1 Average number of marine mammals recorded per observation at the test site: 2009-2010 (EMEC, 2009-2010)[89]

Species	Average number per observation											
	APR 09	MAY 09	JUN 09	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 10	FEB 10	MAR 10
Grey seal	0.43	0.20	1.14	0.32	0.38	0.71	0.65	0.50	0.93	0.85	0.69	0.83
Harbour seal	0.00	0.07	0.00	0.23	0.00	0.00	0.12	0.08	0.00	0.00	0.00	0.00
Unidentified seal	0.43	0.27	0.29	0.41	0.44	0.29	0.24	0.42	0.13	0.15	0.25	0.17

This information was then used along with SAC data and information to establish the potential importance of the test site for each qualifying feature and to assess the potential impacts of the proposed deployment on each relevant qualifying feature. The results of this process are presented in the following sections.

3.2.1 Faray and Holm of Faray SAC

Qualifying feature	Grey seal
Distance to deployment site (km)	50 km
Site condition	Favourable maintained
UK pup production	47,540 (pup production)
% UK grey seal pup production (and number)	9.0 %
Pup production at SAC	4,278.6 (pup production)
Average (maximum) number of grey seals recorded per observation at the wave test site	1.14 (June 09)

Grey seal pup production has remained relatively constant in Orkney since 2004. Given the small scale of the development and the relatively low number of grey seals observed across the test site during the 2009-2010 survey period and more specifically within the proposed deployment area, as well as the favourable condition of the SAC, it is considered that any impacts on SAC seals would be so minimal that the conservation objectives will not be undermined.

[8] Please note the highest monthly average number observed across the test site is highlighted in green for each species in Table 3.1.

[9] Please note that the discrepancies in observation periods exist for marine mammals in the same way that has been highlighted for birds. Therefore the values presented here are worst-case.

Conclusion – the proposals will have no significant effect on the site integrity.

3.2.2 North Rona SAC

Qualifying feature	Grey seal
Distance to deployment site (km)	~150 km
Site condition	Favourable maintained
UK pup production	47,540 (pup production)
% UK grey seal pup production (and number)	5.0%
Pup production at SAC	2,377 (pup production)
Average (maximum) number of grey seals recorded per observation at the wave test site	1.14 (June 09)

Given the distance between the proposed deployment location and North Rona SAC, the favourable site condition of North Rona SAC and the relatively small number of grey seals observed within the test site and more specifically, the berth site itself, it is likely that any impacts (although unlikely) will be so minimal that the conservation objectives of the site will not be undermined.

Conclusion – no LSE

3.2.3 Sanday SAC

Qualifying feature	Harbour seal
Distance to deployment site (km)	62 km
Site condition	Favourable maintained
UK pup production	25,650 (population)
% UK grey seal pup production (and number)	4.0%
Pup production at SAC	1,026 (population)
Average (maximum) number of harbour seals recorded per observation at the wave test site	0.23 (July 09)

The Orkney harbour seal population declined by approximately 67% since the late 1990s and has been falling at an average rate of approximately 13% per annum since 2001.

Given the number of harbour seals observed across the test site and more specifically within the proposed deployment area from 2009-2010 along with the small scale of development, it is considered that any impacts on SAC seals would be so minimal that the conservation objectives of the site will not be undermined.

Conclusion – the proposals will have no significant effect on the site integrity.

3.3 Potential implications of the proposed deployment on SACs – conclusions

As shown in Section 3.2 the numbers of grey seals and harbour seals observed across the whole test site are very low for both species. This site is not therefore, considered to be particularly sensitive to the proposed activities and is not deemed to be particularly important for any of the SAC qualifying features identified. It is concluded therefore, the proposals will have no significant effect on the site integrity of the SACs identified. This conclusion is supported by the findings of the environmental appraisal (Aquatera, 2012) which indentified no potentially significant issues on marine mammals that may arise from the proposed deployment.

It is therefore recommended, that no further assessment of the implications of the proposed development on these SACs with regards to the conservation objectives is required.

Appendix A – Foraging ranges and depths

The foraging ranges used in the identification of those SPAs which could be affected by the proposed deployment are outlined in the table below:

Species	Birdlife Seabird Database Mean maximum foraging distance (km)	PFOW report buffer (ABPmer, 2010)	Buffer distance used in assessment
Razorbill	31	Not used	**35**
Black guillemot	12	Not used	**15**
Atlantic puffin	62.2	Not used	**65**
Common guillemot	60.61	Not used	**65**
Common scoter	8.2	Not used	**10**
Velvet scoter	18	Not used	**20**
Common eider	38.33	Not used	**40**
Red-throated diver	12.21	Not used	**15**
Kittiwake	65.81	Not used	**70**
Little tern	6.94	Not used	**10**
Roseate tern	18.28	Not used	**20**
Common tern	33.81	Not used	**35**
Arctic tern	12.24	Not used	**15**
Sandwich tern	42.3	Not used	**45**
Shag	16.42	Not used	**20**
Cormorant	31.67	Not used	**35**
Fulmar	311.43	Not used	**315**
Manx shearwater	196.46	Not used	**200**
Great skua	42.33	Not used	**45**
Arctic skua	40	Not used	**45**
Gannet	308.36	Not used	**310**
European storm petrel	No data	100	**105**
Leach's storm petrel	No data	100	**105**
Herring gull	No data	54	**55**
Great black-backed gull	No data	40	**45**

The foraging depths used in the identification of those SPAs which could be affected by the proposed deployment are outlined in the table below:

Species	Maximum foraging depth (m)	Mean maximum foraging depth (m)
Razorbill	140	41.09
Black guillemot	50	30.22
Atlantic puffin	70	37.03
Common guillemot	200	90.06
Common scoter	20	9.3
Velvet scoter	65	13.38
Common eider	42	11.02
Red-throated diver	9	7.5

Species	Maximum foraging depth (m)	Mean maximum foraging depth (m)
Little gull	N/A	N/A
Kittiwake	N/A	N/A
Little tern	N/A	N/A
Roseate tern	7	6.75
Common tern	1-2	1-2
Arctic tern	N/A	N/A
Sandwich tern	20	20
Shag	80	33.43
Great Cormorant	35	12.07
Fulmar	N/A	N/A
Manx shearwater	N/A	N/A
Great skua	N/A	N/A
Arctic skua	N/A	N/A
Gannet	34	8.8
European storm petrel	No data	No data
Leach's storm petrel	No data	No data
Herring gull	No data	No data
Great black-backed gull	No data	No data

Appendix B – Definition of a project specific 'longlist' of SPAs and initial screening results

Key - | | Qualifying feature scoped out | | Qualifying feature scoped in |

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
Auskerry SPA	Arctic tern	Yes	No	15	44.75	NO	No LSE
	Storm Petrel	Yes	No	105	44.75	YES	Potential LSE
Buchan Ness to Collieston Coast SPA	Seabird assemblage	Yes	No	N/A	188.83	N/A	N/A
	Guillemot	Yes	No	65	188.83	NO	No LSE
	Herring gull	Yes	No	55	188.83	NO	No LSE
	Kittiwake	Yes	No	70	188.83	NO	No LSE
	Fulmar	Yes	No	315	188.83	YES	Potential LSE
	Shag	Yes	No	20	188.83	NO	No LSE
Calf of Eday SPA	Seabird assemblage	Yes	No	N/A	43.70	N/A	N/A
	Great black-backed gull	Yes	No	45	43.70	YES	Potential LSE
	Guillemot	Yes	No	65	43.70	YES	Potential LSE
	Kittiwake	Yes	No	70	43.70	YES	Potential LSE
	Cormorant	Yes	No	35	43.70	NO	No LSE
	Fulmar	Yes	No	315	43.70	YES	Potential LSE
Cape Wrath SPA	Seabird assemblage	Yes	No	N/A	89.99	N/A	N/A
	Guillemot	Yes	No	65	89.99	NO	No LSE
	Kittiwake	Yes	No	70	89.99	NO	No LSE
	Fulmar	Yes	No	315	89.99	YES	Potential LSE
	Puffin	Yes	No	65	89.99	NO	No LSE
	Razorbill	Yes	No	35	89.99	NO	No LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
Copinsay SPA	Seabird assemblage	Yes	No	N/A	35.29	NO	N/A
	Great black-backed gull	Yes	No	45	35.29	YES	Potential LSE
	Guillemot	Yes	No	65	35.29	YES	Potential LSE
	Kittiwake	Yes	No	70	35.29	YES	Potential LSE
	Fulmar	Yes	No	315	35.29	YES	Potential LSE
East Caithness Cliffs SPA	Seabird assemblage	Yes	No	N/A	61.69	N/A	N/A
	Great black-backed gull	Yes	No	45	61.69	NO	No LSE
	Guillemot	Yes	No	65	61.69	YES	Potential LSE
	Herring gull	Yes	No	55	61.69	NO	No LSE
	Kittiwake	Yes	No	70	61.69	YES	Potential LSE
	Cormorant	Yes	No	35	61.69	NO	No LSE
	Fulmar	Yes	No	315	61.69	YES	Potential LSE
	Peregrine	Yes	No	N/A	61.69	NO	No LSE
	Puffin	Yes	No	65	61.69	YES	Potential LSE
	Razorbill	Yes	No	35	61.69	NO	No LSE
	Shag	Yes	No	20	61.69	NO	No LSE
Fair Isle SPA	Seabird assemblage	Yes	No	N/A	110.33	N/A	N/A
	Great skua	Yes	No	45	110.33	NO	No LSE
	Guillemot	Yes	No	65	110.33	NO	No LSE
	Kittiwake	Yes	No	70	110.33	NO	No LSE
	Arctic skua	Yes	No	45	110.33	NO	No LSE
	Arctic tern	Yes	No	15	110.33	NO	No LSE
	Fair Isle wren	Yes	No	N/A	110.33	NO	No LSE
	Fulmar	Yes	No	315	110.33	YES	Potential LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
	Gannet	Yes	No	310	110.33	YES	Potential LSE
	Puffin	Yes	No	65	110.33	NO	No LSE
	Razorbill	Yes	No	35	110.33	NO	No LSE
	Shag	Yes	No	20	110.33	NO	No LSE
Fetlar SPA	Seabird assemblage	Yes	No	N/A	219.34	N/A	N/A
	Great skua	Yes	No	45	219.34	NO	No LSE
	Arctic skua	Yes	No	45	219.34	NO	No LSE
	Arctic tern	Yes	No	15	219.34	NO	No LSE
	Dunlin	Yes	No	N/A	219.34	NO	No LSE
	Fulmar	Yes	No	315	219.34	YES	Potential LSE
	Red-necked phalarope	Yes	No	N/A	219.34	NO	No LSE
	Whimbrel	Yes	No	N/A	219.34	NO	No LSE
Flannan Isles SPA	Seabird assemblage	Yes	No	N/A	250.28	N/A	N/A
	Guillemot	Yes	No	65	250.28	NO	No LSE
	Kittiwake	Yes	No	70	250.28	NO	No LSE
	Leach's petrel	Yes	No	105	250.28	NO	No LSE
	Fulmar	Yes	No	315	250.28	YES	Potential LSE
	Puffin	Yes	No	65	250.28	NO	No LSE
	Razorbill	Yes	No	35	250.28	NO	No LSE
Foula SPA	Seabird assemblage	Yes	No	N/A	141.57	N/A	N/A
	Great skua	Yes	No	45	141.57	NO	No LSE
	Guillemot	Yes	No	65	141.57	NO	No LSE
	Kittiwake	Yes	No	70	141.57	NO	No LSE
	Leach's petrel	Yes	No	105	141.57	NO	No LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
	Arctic skua	Yes	No	45	141.57	NO	No LSE
	Arctic tern	Yes	No	15	141.57	NO	No LSE
	Fulmar	Yes	No	315	141.57	YES	Potential LSE
	Puffin	Yes	No	65	141.57	NO	No LSE
	Razorbill	Yes	No	35	141.57	NO	No LSE
Fowlsheugh SPA	Seabird assemblage	Yes	No	N/A	235.03	N/A	N/A
	Guillemot	Yes	No	65	235.03	NO	No LSE
	Herring gull	Yes	No	55	235.03	NO	No LSE
	Kittiwake	Yes	No	70	235.03	NO	No LSE
	Fulmar	Yes	No	315	235.03	YES	Potential LSE
	Razorbill	Yes	No	35	235.03	NO	No LSE
Handa SPA	Seabird assemblage	Yes	No	N/A	118.82	N/A	N/A
	Great skua	Yes	No	45	118.82	NO	No LSE
	Guillemot	Yes	No	65	118.82	NO	No LSE
	Kittiwake	Yes	No	70	118.82	NO	No LSE
	Fulmar	Yes	No	315	118.82	YES	Potential LSE
	Razorbill	Yes	No	35	118.82	NO	No LSE
Hermaness, Saxa Vord and Valla Field SPA	Seabird assemblage	Yes	No	N/A	236.46	N/A	N/A
	Great skua	Yes	No	45	236.46	NO	No LSE
	Guillemot	Yes	No	65	236.46	NO	No LSE
	Kittiwake	Yes	No	70	236.46	NO	No LSE
	Fulmar	Yes	No	315	236.46	YES	Potential LSE
	Gannet	Yes	No	310	236.46	YES	Potential LSE
	Puffin	Yes	No	65	236.46	NO	No LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
	Red-throated diver	Yes	No	15	236.46	NO	No LSE
	Shag	Yes	No	20	236.46	NO	No LSE
Hoy SPA	Seabird assemblage	Yes	No	N/A	339.26	N/A	N/A
	Great skua	Yes	No	45	1.84	YES	Potential LSE
	Great black-backed gull	Yes	No	45	1.84	YES	Potential LSE
	Guillemot	Yes	No	65	1.84	YES	Potential LSE
	Kittiwake	Yes	No	70	1.84	YES	Potential LSE
	Arctic skua	Yes	No	45	1.84	YES	Potential LSE
	Fulmar	Yes	No	315	1.84	YES	Potential LSE
	Peregrine	Yes	No	N/A	1.84	NO	No LSE
	Puffin	Yes	No	65	1.84	YES	Potential LSE
	Red-throated diver	Yes	No	15	1.84	YES	Potential LSE
Marwick Head SPA	Seabird assemblage	Yes	No	N/A	13.15	N/A	N/A
	Guillemot	Yes	No	65	13.15	YES	Potential LSE
	Kittiwake	Yes	No	70	13.15	YES	Potential LSE
North Caithness Cliffs SPA	Seabird assemblage	Yes	No	N/A	29.85	N/A	N/A
	Guillemot	Yes	No	65	29.85	YES	Potential LSE
	Kittiwake	Yes	No	70	29.85	YES	Potential LSE
	Fulmar	Yes	No	315	29.85	YES	Potential LSE
	Peregrine	Yes	No	N/A	29.85	NO	No LSE
	Puffin	Yes	No	65	29.85	YES	Potential LSE
	Razorbill	Yes	No	35	29.85	YES	Potential LSE
North Rona and Sula Sgeir SPA	Seabird assemblage	Yes	No	N/A	137.40	N/A	N/A
	Great black-backed gull	Yes	No	45	137.40	NO	No LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
	Guillemot	Yes	No	65	137.40	NO	No LSE
	Kittiwake	Yes	No	70	137.40	NO	No LSE
	Leach's petrel	Yes	No	105	137.40	NO	No LSE
	Fulmar	Yes	No	315	137.40	YES	Potential LSE
	Gannet	Yes	No	310	137.40	YES	Potential LSE
	Puffin	Yes	No	65	137.40	NO	No LSE
	Razorbill	Yes	No	35	137.40	NO	No LSE
	Storm Petrel	Yes	No	105	137.40	NO	No LSE
Noss SPA	Seabird assemblage	Yes	No	N/A	180.69	N/A	N/A
	Great skua	Yes	No	45	180.69	NO	No LSE
	Guillemot	Yes	No	65	180.69	NO	No LSE
	Kittiwake	Yes	No	70	180.69	NO	No LSE
	Fulmar	Yes	No	315	180.69	YES	Potential LSE
	Gannet	Yes	No	310	180.69	YES	Potential LSE
	Puffin	Yes	No	65	180.69	NO	No LSE
Papa Westray (North Hill and Holm) SPA	Arctic skua	Yes	No	45	49.81	NO	No LSE
	Arctic tern	Yes	No	15	49.81	NO	No LSE
Rousay SPA	Seabird assemblage	Yes	No	N/A	22.85	N/A	N/A
	Guillemot	Yes	No	65	22.85	YES	Potential LSE
	Kittiwake	Yes	No	70	22.85	YES	Potential LSE
	Arctic skua	Yes	No	45	22.85	YES	Potential LSE
	Arctic tern	Yes	No	15	22.85	NO	No LSE
	Fulmar	Yes	No	315	22.85	YES	Potential LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
Sule Skerry and Sule Stack SPA	Seabird assemblage	Yes	No	N/A	57.11	N/A	N/A
	Guillemot	Yes	No	65	57.11	YES	Potential LSE
	Leach's petrel	Yes	No	105	57.11	YES	Potential LSE
	Gannet	Yes	No	310	57.11	YES	Potential LSE
	Puffin	Yes	No	65	57.11	YES	Potential LSE
	Shag	Yes	No	20	57.11	NO	No LSE
	Storm Petrel	Yes	No	105	57.11	YES	Potential LSE
Sumburgh Head SPA	Seabird assemblage	Yes	No	N/A	23.58	N/A	N/A
	Guillemot	Yes	No	65	149.92	NO	No LSE
	Kittiwake	Yes	No	70	149.92	NO	No LSE
	Arctic tern	Yes	No	15	149.92	NO	No LSE
	Fulmar	Yes	No	315	149.92	YES	Potential LSE
The Shiant Isles SPA	Seabird assemblage	Yes	No	N/A	204.40	N/A	N/A
	Guillemot	Yes	No	65	204.40	NO	No LSE
	Kittiwake	Yes	No	70	204.40	NO	No LSE
	Fulmar	Yes	No	315	204.40	YES	Potential LSE
	Puffin	Yes	No	65	204.40	NO	No LSE
	Razorbill	Yes	No	35	204.40	NO	No LSE
	Shag	Yes	No	20	204.40	NO	No LSE
	Greenland Barnacle goose	No	Yes	N/A	204.40	NO	No LSE
Troup, Pennan and Lion`s Heads SPA	Seabird assemblage	Yes	No	N/A	151.91	N/A	N/A
	Guillemot	Yes	No	65	151.91	NO	No LSE
	Herring gull	Yes	No	55	151.91	NO	No LSE

Site	Qualifying Feature	Breeding season	Non-breeding season	Mean-max Foraging buffer distance (km)*	Distance from site (km)	Overlap with mean-max foraging buffer	Screening Conclusion
	Kittiwake	Yes	No	70	151.91	NO	No LSE
	Fulmar	Yes	No	315	151.91	YES	Potential LSE
	Razorbill	Yes	No	35	151.91	NO	No LSE
West Westray SPA	Seabird assemblage	Yes	No	N/A	36.34	N/A	N/A
	Guillemot	Yes	No	65	36.34	YES	Potential LSE
	Kittiwake	Yes	No	70	36.34	YES	Potential LSE
	Arctic skua	Yes	No	45	36.34	YES	Potential LSE
	Arctic tern	Yes	No	15	36.34	NO	No LSE
	Fulmar	Yes	No	315	36.34	YES	Potential LSE
	Razorbill	Yes	No	35	36.34	NO	No LSE