

Kincardine Floating Offshore Windfarm

HRA Additional Information Addendum
(Appendix B of ES Additional Information
Addendum)
KOWL

23 September 2016



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This document has 16 pages including the cover.

Document history

Job number: 5143273			Document ref: HRA Addendum to ES			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	HRA addendum (as submitted as part of ES and HRA addendum_DRAFT_v1)	WM	AC	SV	RJW	30/08/16
Rev 2.0	HRA addendum (now Appendix B of ES Addendum_15/09/2016_v2)	WM	AC	SV	RJW	15/09/16
Rev 3.0	Final Edits post MS LOT meeting	AHP	AC	RJW	RJW	23/09/16

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1. Background

The KOWL Environmental Statement (ES) and Habitats Regulations Appraisal (HRA) was submitted on 8th April 2016 to Marine Scotland's Licensing Operations Team (MS-LOT) as part of the Marine Licence application for the works under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act (2009).

Responses to the first round of consultation were received by MS-LOT from SNH on 18th May 2016 and the RSPB on 19th May 2016.

Both responses include comments and recommendations that have been addressed and taken account of in this addendum document (HRA Addendum).

Both responses highlight the potential for the Project to have adverse impacts to seabirds in-combination with other proposed wind farm developments, namely:

- Black-legged kittiwake (breeding) – Fowlsheugh SPA
- Atlantic puffin (breeding) – Forth Islands SPA

These potential impacts are particularly relevant in light of the outcomes of the judicial review¹ where the case was ruled in favour of RSPB Scotland regarding the in-combination impacts of the previously consented Forth and Tay offshore wind projects, including Inch Cape, Seagreen Alpha and Bravo and Neart na Gaoithe.

1.1. SNH Response

SNH, in their response (Ref: CNS/REN/Wind/Demonstrator sites/Kincardine offshore floating wind/CEA140927) it is stated that:

“We conclude that for this proposal alone there is no adverse effect on site integrity for bird interests”.

They go on to state:

“However, when we consider the Kincardine proposal in combination with other developments, specifically other wind farms consented for the east coast, Hywind and the three Forth and Tay offshore wind farms (Neart na Gaoithe, Seagreen – Alpha and Bravo and Inch Cape) within species' mean-max foraging range (mmfr), we cannot advise that there will be no adverse effect on site integrity with respect to:

- Black-legged kittiwake (breeding) – Fowlsheugh SPA
- Atlantic puffin (breeding) – Forth Islands SPA

1.2. RSPB Response

RSPB Scotland, in their response stated: “we consider a conclusion of no adverse effect on site integrity of the relevant SPAs could not be reached. This is primarily due to existing unacceptable cumulative or in-combination effects arising from consented offshore wind in the Forth and Tay region”.

They go on to state: “Should the existing Forth and Tay consents change as a result of the judicial review such that their impacts reduce significantly then RSPB Scotland would be willing to review our current position on the Kincardine offshore wind project”.

Based on the conclusions of the two responses. It is proposed in this addendum to address in-combination impacts to breeding Kittiwake from Fowlsheugh SPA and Puffin from Forth Islands SPA only (see Section 2 below).

¹ <https://www.scotcourts.gov.uk/search-judgments/judgment?id=d69419a7-8980-69d2-b500-ff0000d74aa7>

2. In-combination Assessment

Both SNH and RSPB Scotland have advised that a conclusion of no adverse effect could not be reached for Kittiwake from Fowlsheugh SPA and Puffin from Forth Islands SPA.

KOWL recognises the significant impacts the Forth and Tay wind farm developments have on ornithological interest features of SPAs in the North Sea, particularly regarding kittiwake from Fowlsheugh SPA that have seen significant declines since its designation.

The scale of these impacts are such that any additional impacts in-combination with these projects, no matter how small, will result in an adverse effect on the integrity of the SPA in-combination.

With this in mind, the discussions with SNH and the RSPB have focused on KOWL proposing potential mitigation measures that could be put in place to reduce the already small impacts of the Project to a point where they are insignificant enough to no longer act in-combination with wind farm projects of a much larger scale.

Kincardine collision impacts to Kittiwake from Fowlsheugh SPA using option 2, estimate that 8 birds a year will be lost, or 0.044% of the SPA population. No Puffin from Forth Islands will be lost due to collisions.

The displacement assessment estimates that 19 kittiwake will be displaced by Kincardine, leading to a reduction in breeding success of 0.1% and adult mortality of 10 birds or 0.05% of the SPA population. 5 puffin to be displaced, resulting in a 0.004% reduction in breeding success and an adult mortality of 3 birds a year or 0.003% of the SPA population.

These displacement assessments assume that 100% of displaced birds fail to reproduce and a 50% mortality rate of all birds displaced. As outlined in SNHs response, dated 18th May 2016, this is a very precautionary approach.

High levels of precaution have been included at every stage of the assessment process and represents the very worst case scenario with regards to impacts from the Project alone. These include:

- Using the highest densities of birds using the site over two years of survey.
- Using the most precautionary avoidance rates.
- Using the most precautionary flight type.
- Running Collision Risk Modelling for birds within a worst case foraging range.
- Using worst case WTG model parameters.
- Hi-Def Parallax flight estimation can lead to overestimation of flight height (by approximately 25%). This adds a high level of precaution into the flight heights measured on site and used in collision risk modelling.

2.1. Mitigation

This floating offshore wind project is part of the Scottish Governments 'Survey, Deploy and Monitor' scheme, and the design of the sub-structure lends itself well to providing a platform for monitoring the effects of the turbines on seabirds. KOWL have already stated they would welcome SNH, RSPB or other parties (e.g. Masters or PhD, Universities etc.) to be transported out to the structures and use them to install bird detection equipment and carry out monitoring (all subject to agreement with KOWL). As part of the wider Friends of Floating Offshore Wind group and the wider East of Scotland Offshore Windfarm group, cumulative and collaborative monitoring will form a key part of the monitoring phase and with cross sharing of data (e.g. with the EOWDC) it will provide an enhanced understanding on the possible cumulative impacts these developments will have.

KOWL believe this would be very interesting work and could generate some important results and would be willing to support this going forward.

The refined sub-structure design (see ES Addendum - Section 1.3) will feature standing platforms at the point where the turbine is attached to the sub-structure which will allow someone to be able to easily look up at the turbine and gain a good viewpoint of potential collision impacts.

A review the effectiveness of bird collision monitoring equipment was undertaken by the Strategic Ornithological Support Services² that investigated various methods and systems to monitor collisions of birds with offshore windfarms. The results indicate that the potential for some of these systems to aid data collection and monitor interactions of birds with turbines is promising.

One of the recommended systems is called DTbird³ which includes the ability to add HD cameras, noise based bird deterrents and stop the turbine if birds get within a certain distance.

The data can then be collected remotely, analysed and displayed online for anyone with access to view, which means a significant reduction in the health and safety risks associated with collecting data from the site in real time or by observers on the platforms.

This is something that KOWL have previously mentioned to RSPB (meeting with Aedan Smith at the RSPB office in Edinburgh on the 6th July 2016), where KOWL asked them which systems they would want to see on board the floating substructure and KOWL suggested they engage with SNH to identify the required monitoring tools.

KOWL consider that the implementation of mitigation measures of the sort outlined above is line with the Scottish Governments approach to 'Survey, Deploy and Monitor' schemes, and will serve to mitigate the potential impacts of the Project to the point where it will no longer act in-combination with other plans or projects.

At the same time it is an opportunity to collect important data to inform and build on current understanding of the potential impacts that offshore wind turbines could have through their interactions with birds.

² Collier, M.P, Dirksen, S, Krijgsveld, K.L. September 2011, A review of methods to monitor collisions or micro-avoidance of birds with offshore wind turbines. (https://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS03A_Part1.pdf)

³ <http://www.dtbird.com/index.php/>

3. Proposed Special Protection Areas (dSPAs)

In their response, the RSPB requested that an assessment of the potential effects of Kincardine offshore windfarm on the newly proposed and draft Special Protected Areas be undertaken.

On 22nd July 2014, SNH, JNCC and Marine Scotland wrote an information pack which accompanied a public release of information on a suite of Scottish marine draft SPAs⁴. These included:

- Outer Firth of Forth and Tay Bay Complex
- Ythan Estuary
- Moray Firth
- Pentland Firth and Scapa Flow
- North Orkney
- East Mainland Coast, Shetland
- Fetlar
- West Coast of the Outer Hebrides
- Rum
- Sea of the bebrides, Coll and Tiree
- Sound of Gigha
- Solway Firth
- Seas off St Kilda
- Seas off Foula

From this list of 14 draft SPAs, 10 were taken forward to become proposed SPAs and have undergone further public consultation in 2016⁵. These include:

- Bluemull and Colgrave Sounds
- Coll and Tiree
- East Mainland Coast, Shetland
- Moray Firth
- North Orkney
- Rum (new feature proposed)
- Scapa Flow
- Sound of Gigha
- West Coast of the Outer Hebrides
- Ythan Estuary, Sands of Fovie and Meikle Loch (site extension)

A map showing these dSPAs in relation to existing SPAs and SACs is shown in Figure 3-1 below. These sites in relation to the foraging ranges of the bird species assessed as part of the Project HRA and ES is shown in Figure 3-2 below. This is for reference only and does not include all of the interest features of the dSPAs.

The proposed features of the dSPAs as listed in their citations are listed in Table 3-1 below, along with their distance from the Project site.

⁴ The suite of Scottish marine dSPAs, SNH, JNCC and MS, 22nd July 2014. <http://www.snh.gov.uk/docs/A1350044.pdf>

⁵ 2016 SPA Consultation Overview, Consultation on proposals for 10 Special Protected Areas in the seas around Scotland, SNH, Marine Scotland and the Scottish Government, <http://www.snh.gov.uk/docs/A2017643.pdf>

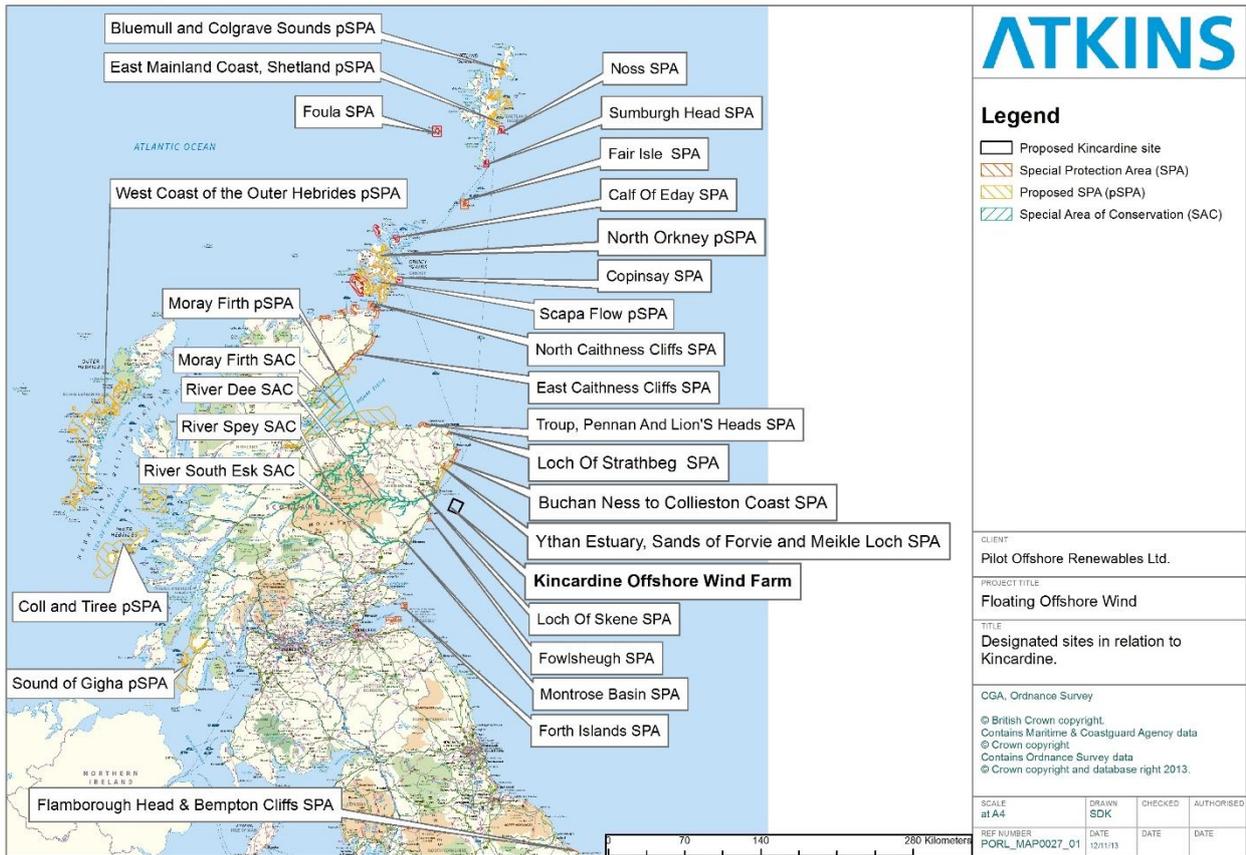


Figure 3-1 A map of all Scottish proposed SPAs (pSPAs) in relation to other SPAs and SACs.

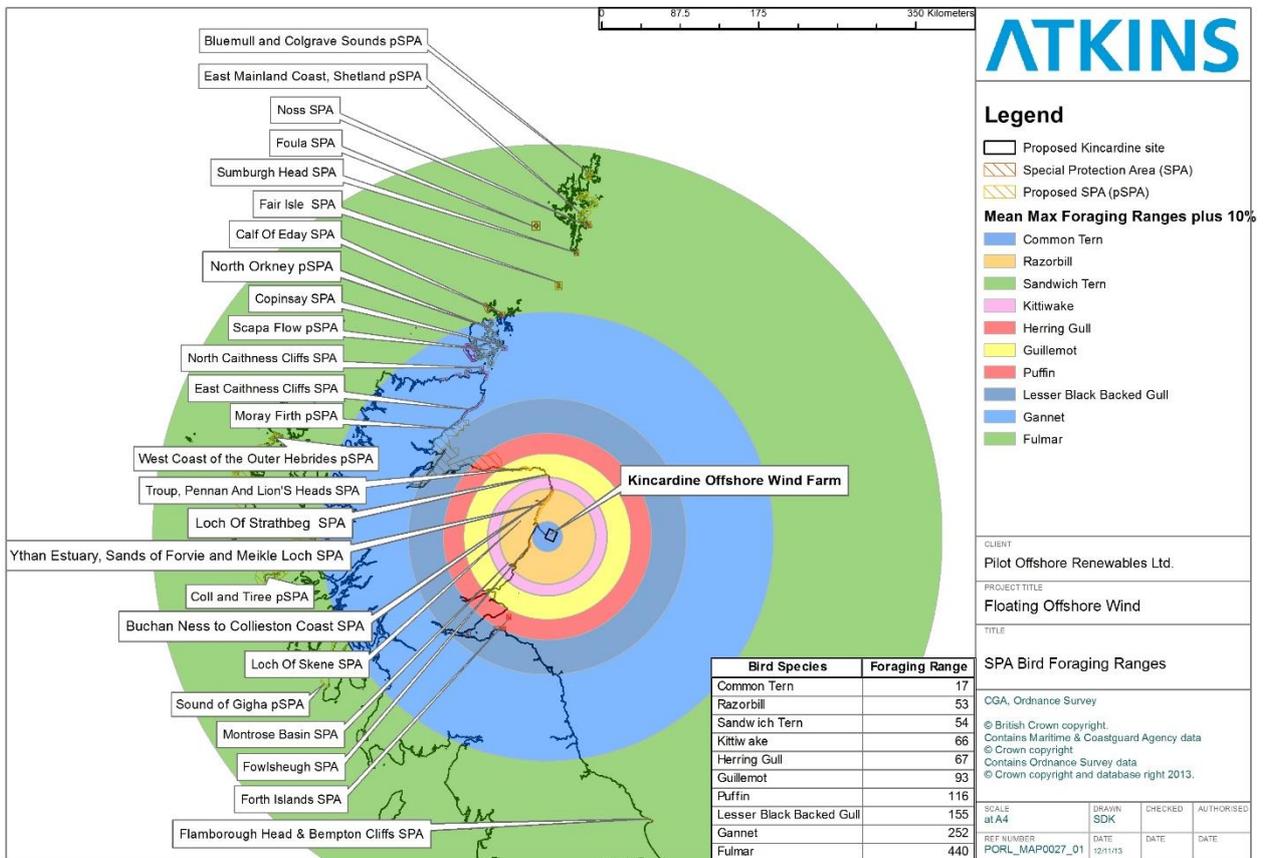


Figure 3-2 Proposed SPAs within foraging range of the Kincardine wind farm site.

Table 3-1 Designated features of the proposed SPAs.

Nature Conservation Site	Designation	Features	Distance from Scheme
Moray Firth	Proposed SPA	<p>The Moray Firth proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (a mean peak annual non-breeding population of 144 individuals (5.8% of the Great Britain population) for the years 2001/02-2006/07), red-throated diver <i>Gavia stellata</i> (a mean peak annual non-breeding population of 324 individuals (1.9% of the Great Britain population) for the years 2001/02-2006/07) and Slavonian grebe <i>Podiceps auritus</i> (a mean peak annual non-breeding population of 43 individuals (3.9% of the Great Britain population) for the years 2001/02-2005/06).</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: greater scaup <i>Aythya marila</i> (a mean peak annual non-breeding population of 930 individuals (17.9% of the Great Britain population) for the years 2001/02 to 2005/06), common eider <i>Somateria mollissima</i> (a mean peak annual non-breeding population of 1,733 individuals (2.9% of the Great Britain population) for the years of 2001/02 to 2006/07), long-tailed duck <i>Clangula hyemalis</i> (a mean peak annual non-breeding population of 5,001 individuals (45.5% of the Great Britain population) for the years of 2001/02 to 2005/6), common scoter <i>Melanitta nigra</i> (a mean peak annual non-breeding population of 5,479 individuals (5.5% of the Great Britain population) for the years 2001/02 to 2005/06), velvet scoter <i>Melanitta fusca</i> (a mean peak annual non-breeding population of 1,488 individuals (59.5% of the Great Britain population) for the years 2001/02 to 2005/06), common goldeneye <i>Bucephala clangula</i> (a mean peak annual non-breeding population of 907 individuals (4.5% of the Great Britain population) for the years 2001/02 to 2005/06), red-breasted merganser <i>Mergus serrator</i> (a mean peak annual non-breeding population of 151 individuals (1.8% of the Great Britain population) for the years of 2001/02 to 2005/06) and European shag <i>Phalacrocorax aristotelis</i> (at least 6,462 individuals during the non-breeding season (3.2% of the biogeographic population and 5.9% of the Great Britain population) and 5,494 individuals during the breeding season ((2.7% of the biogeographic population & 10.2% of the Great Britain population) for the years 1980-2006).</p>	86km
Scapa flow	Proposed SPA	<p>The Scapa Flow proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (a mean peak annual non-breeding population of 506 birds (20.2% of the GB population) for the years 1998/99-2006/7), black-throated diver <i>Gavia arctica</i> (a mean peak annual non-breeding population of 57 birds (9.5% of the GB population) for the years 1998/99-2006/7) and Slavonian grebe <i>Podiceps auritus</i> (a mean peak annual non-breeding population of 135 birds (12.3% of the GB population) for the years 1998/99-2006/7).</p> <p>The site also qualifies under Article 4.1 by regularly supporting a population of European importance of the following Annex 1 species during the breeding season: red-throated diver <i>Gavia stellata</i> (up to 81 pairs (7.6% of the GB population) in 2006).</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider <i>Somateria mollissima</i> (a mean peak annual non-breeding population of 1994 birds (3.3% of the GB population) for the years of 1998/99 to 2006/07), long-tailed duck <i>Clangula hyemalis</i> (a mean peak annual non-breeding population of 1,393 birds (12.7% of the GB population) for the years of 1998/99 to 2006/07),</p>	213km

Nature Conservation Site	Designation	Features	Distance from Scheme
		<p>common goldeneye <i>Bucephala clangula</i> (a mean peak annual non-breeding population of 219 birds (1.1% of the GB population) for the years 1998/99 to 2006/07), red-breasted merganser <i>Mergus serrator</i> (a mean peak annual non-breeding population of 539 birds (6.4% of the GB population) for the years of 1998/99 to 2006/07), and European shag <i>Phalacrocorax aristotelis</i> (a mean peak annual non-breeding population of 2929 birds (1.5% of the biogeographic population) for the years of 1998/99 to 2006/07).</p>	
North Orkney	Proposed SPA	<p>The North Orkney proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (a mean peak annual non-breeding population of 310 birds (12.4% of the Great Britain population) for the years 2006/07 to 2008/09) and Slavonian grebe <i>Podiceps auritus</i> (a mean peak annual non-breeding population of 120 birds (10.9% of the Great Britain population) for the years 2007/08-2008/9).</p> <p>The site also qualifies under Article 4.1 by regularly supporting a population of European importance of the following Annex 1 species during the breeding season: red-throated diver <i>Gavia stellata</i> of up to 52 pairs (4.4% of the Great Britain population) for the year of 2006.</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider <i>Somateria mollissima</i> (a mean peak annual non-breeding population of 1,453 birds (2.4% of the Great Britain population) for the years of 2006/07 to 2008/09), long-tailed duck <i>Clangula hyemalis</i> (a mean peak annual non-breeding population of 937 birds (8.5% of the Great Britain population) for the years of 2006/07 to 2008/09), velvet scoter <i>Melanitta fusca</i> (a mean peak annual non-breeding population of 147 birds (5.9% of the Great Britain population) for the years of 2006/07 to 2008/09), red-breasted merganser <i>Mergus serrator</i> (a mean peak annual non-breeding population of 344 birds (4.1% of the Great Britain population) for the years of 2007/08 to 2008/09) and European shag <i>Phalacrocorax aristotelis</i> (a mean peak annual non-breeding population of 1742 birds (1.6% of the Great Britain population) for the years of 2007/08 to 2008/09).</p>	245km
Sound of Gigha	Proposed SPA	<p>The Sound of Gigha proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a wintering population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (for the years 2004/05 to 2007/08 a mean peak annual wintering population of 505 individuals (20.2% of the Great Britain population)).</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider <i>Somateria mollissima</i> (for the years of 2004/05 to 2007/08 a mean peak annual wintering population of 1,295 individuals (2.2% of the Great Britain population)) and red-breasted merganser <i>Mergus serrator</i> (for the years of 2004/05 to 2007/08a mean peak annual wintering population of 117 individuals (1.4% of the Great Britain population)).</p>	298km

Nature Conservation Site	Designation	Features	Distance from Scheme
Coll and Tiree	Proposed SPA	<p>The Coll and Tiree proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a wintering population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (a mean peak annual wintering population of 460 individuals, 18.4% of the Great Britain population) for the years of 2003/04 to 2007/08).</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider <i>Somateria mollissima</i> (a mean peak annual wintering population of 1,465 individuals, 2.4% of the GB population) for the years of 2003/04 to 2007/08).</p>	304km
West Coast of the Outer Hebrides	Proposed SPA	<p>The West Coast of the Outer Hebrides proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: great northern diver <i>Gavia immer</i> (a mean peak annual non-breeding population of 1,298 individuals (52% of the Great Britain (GB) population) for the years 2002/03 to 2006/07), black-throated diver <i>Gavia arctica</i> (a mean peak annual non-breeding population of 43 individuals (7.2% of the GB population) for the years 2007/08-2009/10) and Slavonian grebe <i>Podiceps auritus</i> (a mean peak annual non-breeding population of 51 individuals (4.6% of the GB population) for the years 2007/08-2009/10).</p> <p>The site also qualifies under Article 4.1 by regularly supporting a population of European importance of the Annex 1 species red-throated diver <i>Gavia stellata</i> during the breeding season. The foraging area is available for up to 58 pairs breeding on the nearby islands (4.5% of the Great Britain population in 2006).</p> <p>The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider <i>Somateria mollissima</i> (a mean peak annual non-breeding population of 5,074 individuals (8.5% of the Great Britain population) for the years of 2002/03 to 2006/07), long-tailed duck <i>Clangula hyemalis</i> (a mean peak annual non-breeding population of 821 birds (7.5% of the Great Britain population) for the years of 2002/03 to 2006/07) and red-breasted merganser <i>Mergus serrator</i> (a mean peak annual non-breeding population of 239 individuals (2.8% of the Great Britain population) for the years of 2007/08 to 2009/10).</p>	317km
East Mainland Coast, Shetland	Proposed SPA	<p>This site supports one of the largest concentrations of long-tailed duck and red-breasted merganser in eastern Scotland. In addition the East Mainland Coast, Shetland pSPA site comprises the largest of the six red-throated diver marine feeding areas identified. Located on the northern edge of the British range, it is a vital component of the core range of the species.</p> <ul style="list-style-type: none"> - Great northern diver (non-breeding) – pop size on site: 180 (7% of GB pop) - Red-throated diver (breeding) – pop size on site: 210 pairs (17% of GB pop) - Slavonian grebe (non-breeding) – pop size on site: 50 (4% of GB pop) - Long-tailed duck (non-breeding) – pop size on site: 160 (2% of GB pop) <p>Red-breasted merganser (non-breeding) – pop size on site: 230 (3% of GB pop)</p>	344km

Nature Conservation Site	Designation	Features	Distance from Scheme
Bluemull and Colgrave Sounds	Proposed SPA	The Bluemull and Colgrave Sounds proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a population of European importance of the following Annex 1 species during the breeding season: red throated diver <i>Gavia stellata</i> (up to 194 pairs in 2006, up to 15.4% of the GB population).	392km
Ythan Estuary, Sands of Fovie and Meikle Loch site extension	Proposed SPA	Ythan Estuary, Sands of Forvie and Meikle Loch SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species: Sandwich tern <i>Sterna sandvicensis</i> (1989 to 1991, up to 1125 pairs, up to 7% of the GB population); common tern <i>Sterna hirundo</i> (1989 to 1993, up to 265 pairs, up to 2% of the GB population); and little tern <i>Sterna albifrons</i> (1989 to 1993, up to 41 pairs, up to 2% of the GB population). The proposed marine component, immediately offshore of the terrestrial area forms the foraging zone for both Sandwich terns and little terns. Ythan Estuary, Sands of Forvie and Meikle Loch SPA further qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species: pink-footed goose <i>Anser brachyrhynchus</i> (1988/89 to 1992/93 winter peak mean of 17,213 individuals, 9% of the Eastern Greenland/Iceland/UK biogeographic population). Ythan Estuary, Sands of Forvie and Meikle Loch SPA also qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual waterfowl. During 1988/89 to 1992/93 the site supported a winter peak mean of 26,400 individual waterfowl, comprising 8,000 waders and 18,400 wildfowl including nationally important populations of the following species: pink-footed goose (17,213 individuals, 9% of the GB population) and eider <i>Somateria mollissima</i> (winter peak mean of 1,860 individuals, 2% of the GB population). In the five-year period 1991/92 to 1995/96, a winter peak mean of 51,265 individual waterfowl was recorded with the assemblage additionally including nationally important populations of: redshank <i>Tringa totanus</i> (1,149 individuals, 1% of the GB population) and lapwing <i>Vanellus vanellus</i> (2,542 individuals, 0.2% of the GB population).	16km
Rum SPA - new feature	Proposed SPA	Rum qualifies under Article 4.1 by regularly supporting a population of European importance of the Annex 1 species red-throated diver <i>Gavia stellata</i> (13 pairs in 2010, 1% of Great Britain population), and at least a total of 18 pairs able to feed in the marine area, and golden eagle <i>Aquila chrysaetos</i> (4 pairs, 1% of the Great Britain population). The site also qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species Manx shearwater <i>Puffinus puffinus</i> (61,000 pairs, 23% of the world biogeographic population). Rum further qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 130,000 seabirds including nationally important populations of the following species: black-legged kittiwake <i>Rissa tridactyla</i> (1,500 pairs, 0.3% of the Great Britain population), common guillemot <i>Uria aalge</i> (4,000 individuals, 0.4% of Great Britain population), and Manx shearwater (61,000 pairs).	266km

3.1. Assessment of KOWL Likely Significant Effects on proposed SPAs.

An analysis of the aerial bird survey data against proposed interest species and their foraging ranges (where available in Thaxter *et al*⁶) has been carried out and is outlined in Table 3-2 below. Of all the proposed interest features, only three species were present on site, red throated diver (a total of 2 individuals), great northern diver (a total of 1 individual) and redshank (a total of 1 individual).

All other species proposed for designation as part of the suite of marine SPAs do not occur within the Project survey area and in most cases are out of foraging range of the KOWL site. The Project will therefore have no likely significant effects on these species, either alone or in-combination with other plans or projects.

Red Throated Diver

The nearest pSPA that has red throated diver (RTD) as a proposed interest feature is over 86km away. Based on Thaxter *et al*⁶, the approximate foraging range for RTD is 9km. A similar breeding season range is described in the SNH guidance note on assessing the connectivity with SPAs⁷ (July 2013) and is quoted as 'generally less than 8km, but regular flights of 11 to 13.5km recorded on western isles'. It is therefore considered unlikely that the red throated divers present on site originated from any of these pSPAs. Of the 2 individual RTDs only one was sighted during the breeding season (April to September) for which the majority of pSPAs are proposed for this species. Both individuals were 'sitting' on the water when identified in the aerial surveys and not flying at any height where they may potentially be at risk of collision impacts.

It is therefore considered that the project will not have a likely significant effect on red throated divers designated as part of any of the proposed SPAs, either alone or in-combination with other plans or projects.

Great Northern Diver and Redshank

The foraging ranges for great northern diver and redshank are unknown but, given that only one individual from each species are present within the KOWL site, the Project will not have a Likely Significant Effect on these proposed SPA interested features, alone or in-combination with other plans or projects.

⁶ Thaxter, C. B. Lascelles, B. Sugar, K. Aonghais, S.C.P. Roos, S. Bolton, M. Langston, R. Burton, N.H.K. 2012, Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation* 156 (2012) 53-61.

⁷ <http://www.snh.gov.uk/docs/A994842.pdf>

Table 3-2 Summary of proposed SPA site features in relation to Kincardine.

Species	dSPA	Distance from Site (km)	Foraging range (km)	Individuals on Kincardine site
Red throated diver	Bluemull and Colgrave Sounds	392	9 (11 - 13.5)	2
	East Mainland Coast, Shetland	344		
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	West Coast of the Outer Hebrides	317		
	Rum SPA ¹	266		
Great northern diver	Coll and Tiree	304	-	1
	East Mainland Coast, Shetland	297		
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	Sound of Gigha	298		
	West Coast of the Outer Hebrides	317		
Common eider	Coll and Tiree	304	80	0
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	Sound of Gigha	298		
	West Coast of the Outer Hebrides	317		
Slavonian grebe	East Mainland Coast, Shetland	344	-	0
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	West Coast of the Outer Hebrides	317		
Long-tailed duck	East Mainland Coast, Shetland	344	-	0
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	West Coast of the Outer Hebrides	317		
Red-breasted merganser	East Mainland Coast, Shetland	344	-	0
	Moray Firth	86		
	North Orkney	245		
	Scapa flow	213		
	Sound of Gigha	298		
	West Coast of the Outer Hebrides	317		
Greater scaup	Moray Firth	86	-	0
Common scoter	Moray Firth	86	-	0
Velvet scoter	Moray Firth	86	-	0
	North Orkney	245		
Common goldeneye	Moray Firth	86	-	0
	Scapa flow	213		
European shag	Moray Firth	86	14.5	0
	North Orkney	245		
	Scapa flow	213		
Black-throated diver	Scapa flow	213	<10 ³	0
	West Coast of the Outer Hebrides	317		
Manx shearwater	Rum SPA ¹	266	18.3 (330)	0

Black-legged kittiwake	Rum SPA ¹	266	60	
Common guillemot	Rum SPA ¹	266	84.2	
Sandwich tern	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	49	0
Common tern	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	15.2	0
Little tern	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	6.3	0
Pink-footed goose	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	-	0
Eider	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	80	0
Redshank	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	-	1
Lapwing	Ythan Estuary, Sands of Fovie and Meikle Loch site ²	16	-	0
¹ – New site feature ² – Extension to existing site ³ - http://www.snh.gov.uk/docs/A994842.pdf				

Dr Richard Wakefield

Consenting Manager

Atkins

200 Broomielaw,

Glasgow,

G1 4RU

Richard.Wakefield@atkinsglobal.com

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