Inch Cape Offshore Wind Farm

New Energy for Scotland

Offshore Environmental Statement:
VOLUME 2F
Annex 15B.1: HRA Screening Report

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Inch Cape Offshore Wind Farm

Developing wind energy in the Outer Firth of Tay

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Habitats Regulations Assessment for Special Protection Areas: Screening Report

24 August 2012

QUALITY MANAGEMENT

Inch Cape Offshore Wind Farm **Ornithology** **HRA screening**			
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Date	23/08/2012	**Revision Number**	7

CONTENTS

1 INTRODUCTION

The Project: Inch Cape Offshore Wind Farm

1.1 Inch Cape Offshore Limited (ICOL) proposes to develop the Inch Cape Offshore Wind Farm in the outer Firth of Tay region in Scottish Territorial Waters. It is anticipated to consist of up to 213 wind turbines covering an area of about 150 km^2 with an estimated installed capacity of 1,000 MW and a potential yield of over 3,000 GWh per year.

1.2 The proposed offshore wind farm lies approximately 15–22 km east of the Angus coastline, entirely within Scottish Territorial Waters, in water depths between 30–50 m at lowest astronomical tide, with a 3–4 m tidal range and maximum marine current of circa 1.2 knots. The site boundary is shown in Figure 1.

1.3 RPS has been commissioned as the lead ornithological consultant for the project.

Habitats Regulations Assessment

1.4 A Habitats Regulations Appraisal (HRA) is required under EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (the Habitats Directive). Together with the EC Directive on the Conservation of Wild Birds (2009/147/EC; the Birds Directive), the Habitats Directive underpins a network of European or Natura 2000 Sites. These comprise SPAs, classified under the Birds Directive, and Special Areas of Conservation (SAC), designated under the Habitats Directive.

1.5 An HRA is required where there is a potential for a development to affect a European site. The procedures that must be followed are set out in Article 6 of the Habitats Directive. In Scotland, this process is implemented through The Conservation (Natural Habitats &c.) Regulations 1994, as amended (hereafter referred to as the Habitats Regulations). These regulations apply to sites within Scottish Territorial Waters.

1.6 An HRA is a process to determine likely significant effects and (where such effects are identified) assess whether there are adverse impacts on the integrity of a European site by means of an Appropriate Assessment. This should focus exclusively on the qualifying interests that the European Site is designated for and consider any impacts on the conservation objectives of a site (SNH 2012).

1.7 The Habitats Regulations require an Appropriate Assessment (AA) to be carried out when a plan or project likely to affect a European site:

- is not connected with management of the site for nature conservation; and
- is likely to have a significant effect on the site (either alone or in combination with other plans or projects).

1.8 In light of the conclusions of an Appropriate Assessment, the Competent Authority (the body with the power to give consent for the plan or project) shall give consent only after having ascertained that it will not adversely affect the integrity of the European site concerned. Exceptionally, where an Appropriate Assessment concludes there will be adverse effects on the integrity of a European site, Competent Authorities may agree to a plan or project if there are no alternative solutions and imperative reasons of overriding public interest.

1.9 The HRA process has the following stages (Defra, 2011):

- **Screening**: Identify the likely effects of a project upon a Natura 2000 site, either alone or in combination with other projects or plans, and consider whether these effects may be significant. The burden of evidence is to show, on the basis of objective information, that there will be no significant effect. If the effect may be significant, or is not known, an Appropriate Assessment is required;

- **Appropriate Assessment**: the detailed consideration of the potential effects identified in Stage 1 to establish whether there is any impact on the integrity of Natura 2000 sites, either alone or in combination with other projects or plans, with respect to the Natura 2000 site's conservation objectives, its structure and function. The intention of this process is to determine whether there is objective evidence that adverse effects on the integrity of the site can be excluded. This stage also includes the development of mitigation measures to avoid or reduce any possible effects. The survey data and desk study data and information gathered to inform the Appropriate Assessment will enable an impact assessment in relation to the conservation objectives for qualifying features of each Natura 2000 site identified through the Sceening process.
- **Assessment of alternatives**: alternative ways of achieving the project objectives that would avoid adverse effects on the integrity of the Natura 2000 site, should avoidance or mitigation measures be unable to sufficiently reduce adverse effects; and
- **Where there are no alternatives and adverse impacts remain**: assessment of whether the project is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

1.10 Guidance from SNH on HRA of plans (David Tyledesley & Associates 2010) provides more detail and identifies 13 stages to HRA (Diagram 1). Stages 2–5 of this process involve a screening assessment to determine whether a plan is likely to have a significant effect on a European site.

The Aim of this Report

1.11 This report provides information to underpin a screening assessment for likely significant effects of the proposed Inch Cape Offshore Wind Farm on the qualifying interests of SPAs in order to identify potential SPAs for inclusion with the Appropriate Assessment (Screening). It also provides an outline methodology to undertake the Appropriate Assessment which ICOL would propose to discuss with Marine Scotland and its advisors in response to this document.

1.12 A number of the SPAs potentially affected by Inch Cape are also designated as Ramsar sites, under the Convention on Wetlands of International Importance especially as Waterfowl Habitat. It is Government policy (Scottish Executive 2000) that Ramsar sites are treated as fully designated European sites for the purpose of considering development proposals that may affect them. This report also considers the birds which are qualifying interests of these Ramsar sites.

1.13 A separate report to inform an HRA screening assessment will be prepared in relation to SACs (and non-avian qualifying interests of Ramsar sites).

1.14 For the proposed Inch Cape Offshore Wind Farm, the HRA will be carried out by Marine Scotland, who will be advised by SNH. This report is provided to the Competent Authority and its advisor to inform the HRA screening for the proposed Inch Cape Offshore Wind Farm.

1.15 The report aims to:

- consider the SPAs where there may be likely significant effects (where there is potential connectivity to Inch Cape), the pathways for those effects and the qualifying interests which may be affected;
- screen out SPAs and / or qualifying interests of SPAs where there is no likely significant effect;
- identify SPAs and qualifying interests where there is a likely significant effect (LSE) and an Appropriate Assessment is required;
- identify the scope of in combination assessment; and
- provide an outline methodology for the Appropriate Assessment for consultation with Marine Scotland, SNH and JNCC.

Likely Significant Effect

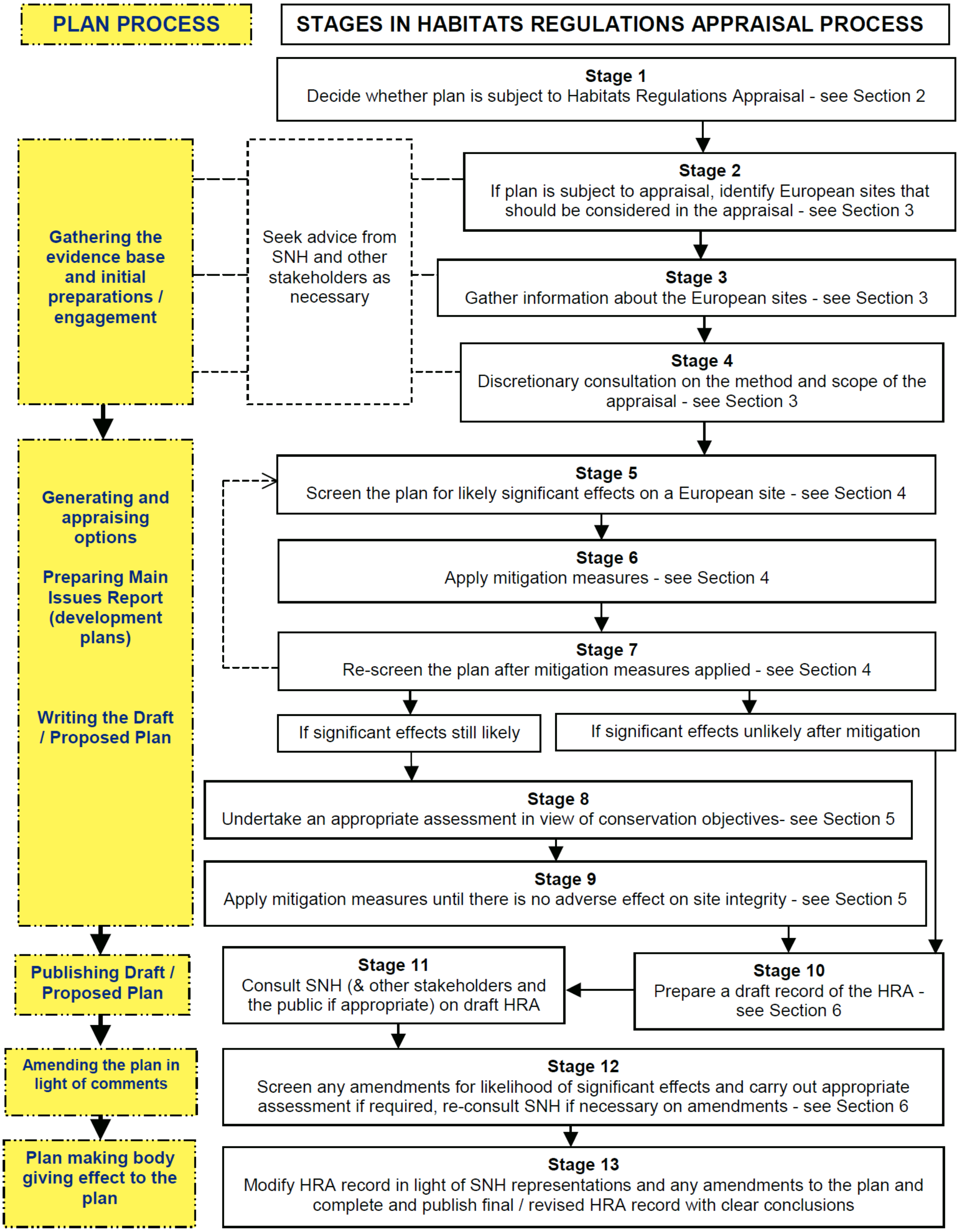
1.16 A 'likely' effect is one that cannot be ruled out on the basis of objective information (David Tyledesley & Associates 2010), and it should be noted that the test is a 'likelihood' rather than a 'certainty' of effects. It would also not be correct to say that any effect is a likely significant effect, and the LSE test should be used to filter out effects that are clearly trivial or inconsequential.

1.17 Case law from the European Court (The Waddenzee case; European Court of Justice C-127/02) ruled that a project should be subject to Appropriate Assessment "if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans and projects". 'Likely', in this context, should therefore be interpreted as whether a significant effect can objectively be ruled out. Where a plan or project could undermine the site's Conservation Objectives, the effects on the site must be considered to be significant.

1.18 It should be noted that a judgement of LSE in no way presupposes a judgement of adverse effect on site integrity. They are two quite separate tests and should not be conflated.

1.19 The aim of the LSE test is therefore to determine whether the plan either alone, or in-combination with other plans and projects and activities, is likely to result in a significant effect on a European site. Given the need for a high level of certainty to meet Habitats Regulations requirements, there is a presumption in favour of 'screening issues in' at this stage, following the precautionary approach (e.g. Marine Scotland 2011). When considering the relevant screening methods to determine LSE, it is therefore understood that there needs to be a presumption in favour of including rather than excluding interest features and designated sites in the HRA process at this stage.

Diagram 1: Stages of the Habitats Regulations Appraisal (David Tyldesley & Associates 2010)



Special Protection Areas (SPAs)

1.20 SPAs are classified under Article 4 of the Birds Directive. Article 4.1 requires the selection of the 'most suitable territories' as SPAs for sites supporting species which are rare or vulnerable in Europe, listed on Annex I of the Directive. Article 4.2 requires the selection of SPAs for regularly occurring migratory species not listed on Annex I, with particular attention to be paid to the protection of wetlands of international importance. The UK criteria for SPA selection and the rationale for the UK SPA network are set out in Stroud et al. (2001). Thresholds for SPA selection for Annex I species are the presence of 1% or more of the British population of a given species, whereas for migratory species the threshold is 1% or more of the relevant international or biogeographic population.

1.21 While SPAs are selected for particular species based on their occurrence during the breeding, winter or passage seasons, legal protection is also provided for these species occurring on a site throughout the year. SPA protection also extends beyond the site boundaries, for example where species may breed or roost within an SPA but forage outside the boundaries.

1.22 It is less clear whether the legal protection conferred by an SPA on a species which uses a site for part of the year only also extends to that species when it is not present on the SPA – e.g. seabirds which breed within colonies which are classified as SPAs but winter elsewhere on offshore areas which are not classified as SPA. Discussions with the Statutory Nature Conservation Bodies (SNH and JNCC) have suggested that on a precautionary basis, birds which use an SPA for part of the year should be considered to 'carry' that SPA protection at all times. In recent advice on a HRA for the proposed Outer Forth Round 3 Zone Offshore Wind Farm (Marine Scotland 2012), SNH and JNCC have advised that 'defining the relevant SPAs to consider for seabird species during the post-breeding, passage and overwintering periods is a much more complicated process that for the breeding season. We are currently considering this issue and intend to provide further advice'.

1.23 Together with the Habitats Directive, the Birds Directive has thus established a network of internationally important sites designated for their ecological status. As part of this, Conservation Objectives are required for all of these sites. For all Scottish SPAs considered in this HRA report, the Conservation Objectives are as follows (taken from SNH's SiteLink website):

- 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:
  - population of the species as a viable component of the site
  - distribution of the species within site
  - distribution and extent of habitats supporting the species
  - structure, function and supporting processes of habitats supporting the species
  - no significant disturbance of the species

1.24 Conservation objectives for SPAs in England are different in format to those for Scottish sites and are produced on a site by site basis (Natural England 2012).

Ramsar Sites

1.25 Ramsar sites are wetlands of international importance designated under the Ramsar Convention 1971, especially as habitats for waterfowl. The first Ramsar sites in the UK were designated in 1976, with an initial emphasis on selecting sites of importance to waterbirds. Consequently many Ramsar sites are also SPAs.

1.26 The main criteria for selection of Ramsar sites for ornithological interests are: (i) if a site regularly supports 20,000 or more water birds; and/or (ii) if it regularly supports at least 1% of the individuals in a population of one species or subspecies of water bird.

1.27 In Scotland, the February 2010 Scottish Planning Policy (SPP) document (SG 2010) states that Ramsar sites are "also Natura sites and/or Sites of Special Scientific Interest and are protected under the relevant statutory regimes". Therefore, in Scotland, where the interests of Ramsar sites correspond with those of overlapping European sites, there is no need to consider them separately (David Tyldesley & Associates 2010).

1.28 A desk study revealed that all Ramsar sites identified as having potential connectivity with the Inch Cape Offshore Wind Farm are coincidental in extent with SPAs. Therefore these sites are not considered separately in this report, on the basis that considering the qualifying species and Conservation Objectives of each SPA will also cover the Ramsar interests.

Report Structure

1.29 The report is structured as follows:

SPAs Considered in the Habitats Regulation Appraisal

1.30 SPAs and qualifying species with potential connectivity to the proposed Inch Cape Offshore Wind Farm site are identified. The proposed Inch Cape Offshore Wind Farm does not overlap with any European sites, but may be important to bird species which are qualifying features of SPAs. Consideration is given to the use of the site:

- during the breeding season by birds which are qualifying species of SPAs – principally the use of the site for foraging / commuting to foraging areas by breeding seabirds at coastal sites; and
- outside the breeding season by passage or wintering birds which are qualifying species of SPAs – including seabirds and migratory birds (in particular waders and waterfowl).

Identifying Likely Significant Effects

1.31 This section considers the potential for LSE on the SPAs and qualifying species identified in the preceding section.

Conclusion: SPAs and Qualifying Species Identified for Appropriate Assessment

1.32 This section summarises the HRA screening for the Inch Cape Offshore Wind Farm. SPAs and qualifying species identified for Appropriate Assessment based on breeding season connectivity are presented, together with proposals for the scope of Appropriate Assessment.

1.33 For the non-breeding season, advice is presented on further work required to clarify the requirements for HRA for seabirds outside the breeding season and non-seabird species which may migrate through Inch Cape. This is preliminary pending further dialogue with Marine Scotland and their statutory nature conservation advisors, SNH and JNCC which it is hoped will result from this screening exercise.

Future Proposals for Marine SPAs

1.34 At the time of writing, the UK Statutory Nature Conservation Agencies are considering potential additions to the UK network of SPAs in marine areas. These include offshore areas used by seabirds for feeding and other activities. Data on the distribution of seabirds at sea is being used to identify hotspots within UK territorial waters which will be considered as potential SPAs (Kober et al. 2010). Should additional SPAs be identified in the near future, these would also need to be considered for HRA in relation to Inch Cape Offshore Wind Farm (and in combination with other plans and projects).

2 SPAS CONSIDERED IN THE HABITATS REGULATIONS APPRAISAL

Introduction

2.1 This section of the report identifies SPAs with potential connectivity to the proposed Inch Cape Offshore Wind Farm.

2.2 The proposed Inch Cape Offshore Wind Farm site does not overlap with any SPAs. Connectivity between the proposed offshore wind farm site and SPAs may arise where individual birds from populations of qualifying species use both an SPA and the proposed offshore wind farm site at some point during their life cycle. During the breeding season, seabirds nesting at colonies in the Forth and Tay regions (and further afield) may forage within the proposed offshore wind farm site or pass through it regularly on foraging trips to and from nest sites. At this time of year, for breeding adults, information on the maximum foraging range from breeding colonies can be used to identify the SPAs from which birds recorded in the Inch Cape Offshore Wind Farm site have the potential to originate.

2.3 Outside the breeding season, seabirds are not restricted by the need to attend a nest, and move further from their breeding colonies. At this time the origin of seabirds and other bird species recorded within the proposed Inch Cape Wind Farm siteis less certain and has been inferred based on current knowledge of migratory movements. In an offshore environment, it is generally very difficult to know from which population a bird at sea originates, unless there is visual continuity between sites or a particular individual is radio-tagged. Consequently, drawing conclusions about impacts of offshore wind farms on populations from individual SPAs relies on assumptions derived from knowledge of the behaviour and movements of birds.

2.4 Connectivity between the proposed Inch Cape Offshore Wind Farm site and SPAs has been assessed by identifying:

- the bird species known or likely to use or pass through the proposed offshore wind farm (see Section 2.6);
- the peak numbers of each species and their seasonal occurrence (breeding and non-breeding (post-breeding/passage/ wintering)), see Section 2.6;
- whether the individuals of these species may potentially form part of the qualifying feature of a UK SPA and/or Ramsar site;
- the SPAs which individuals of each species may use during the breeding and non-breeding seasons.

2.5 For the purposes of the assessment, birds have been divided into seabird and non-seabird species. Seabirds is the term customarily applied to petrels (Procellariformes), gannets (Sulidae), cormorants (Phalacrocoracidae), skuas (Stercorariidae), gulls and terns (Laridae), and auks (Alcidae) (bird species included in Mitchell et al. 2004). Bird names quoted in this report follow the vernacular English names recommended by the British Ornithologists Union (BOU 2012) (as opposed to the international English names recommended by the International Ornithological Congress).

Identifying Bird Species to be Scoped in for HRA

2.6 Direct information on the bird species which use or pass through the proposed Inch Cape Offshore Wind Farm is being collected from boat surveys. A program of monthly surveys of the proposed offshore wind farm site and a surrounding buffer area began in September 2010 and is due to be completed in September 2012. Key components of the survey methodology are summarised in Appendix 1. Further details of these surveys, which follow the recommended standard methodology for offshore boat-based bird surveys, can be provided upon request (RPS 2010, 2012a, b).

2.7 For birds recorded regularly during boat surveys of the proposed Inch Cape Offshore Wind Farm, information on their seasonal occurrence and estimates of the peak numbers present have been derived from the survey data. Any species recorded within the proposed offshore wind farm site and/or the buffer zone is considered to potentially use the wind farm area. The population estimates included in this report apply to the application site and a 4 km buffer (referred to collectively as the Inch Cape survey area), an area of 430 km^2 (Figure 1). This area is defined as the Inch Cape survey area.

2.8 The boat surveys may miss some species which pass through the site on migration. Such species may pass through in large numbers over short period of days or weeks, and may be missed if monthly boat surveys do not coincide with the migration window, and/or if migratory movements tend to take place at night (or high altitude). Other sources of information have been used to identify migratory bird species which may pass through the site in significant numbers, in particular work on migratory pathways for birds commissioned by the Strategic Ornithological Support Services (SOSS) for the UK Offshore Wind Industry (Wright et al. 2012).

2.9 Potential connectivity between SPAs and the proposed Inch Cape Offshore Wind Farm for bird species observed during baseline boat-based surveys is considered in Tables 1, 2 and 3. Species that do not form part of the qualifying interest of any UK SPA (taken from Stroud et al. (2001) and http://jncc.defra.gov.uk/page-1418) are omitted from further assessment. Connectivity for SPA bird species not observed during bird surveys, but which may pass through the site, is considered in Tables 4 and 5.

2.10 For SPA bird species, a distinction is made between connectivity during the breeding season and the non-breeding season (passage / post-breeding and winter). Connectivity during the breeding season is identified only for seabirds where (i) a species was recorded within the Inch Cape survey area during the breeding season; and (ii) the Inch Cape survey area lies within the potential foraging range of an SPA colony where the species is a qualifying feature.

2.11 Potential connectivity for SPA qualifying species outside the breeding season has been examined for seabirds and other bird species which are likely to form part of an SPA population at some stage (during the breeding, passage or wintering periods). For seabirds this has been based on species recorded within the Inch Cape survey area outside the breeding season as well as species which were not recorded but which may pass through based on an assessment of migratory pathways in Wright et al. (2012). Similarly for non-seabird species, such as geese and waders, assessments of potential connectivity (Tables 4 and 5) have been based on species recorded during boat surveys and species which may pass through the site, again based largely on Wright et al. 2012.

2.12 A precautionary approach has been taken in making decisions about whether or not to include species in the next step of the HRA process.

TABLE 1: SEABIRD SPECIES RECORDED DURING SURVEYS AT INCH CAPE IN THE BREEDING SEASON AND INITIAL HRA ASSESSMENT							
Species	**Peak population estimate, breeding season[1] (month)**	**Breeding Season (Months)[2]**	**UK SPA Quali-fier**	**Foraging distance (km) for connectivity[3]**	**SPA(s) within foraging range**	**Inclusion in next step of HRA process**	**Rationale**
Fulmar	70 (Jun)	Mar–July	YES	400	YES	YES	SPA(s) within foraging range
Gannet	2760 (Jul)	*Apr–Sept*	YES	354	YES	YES	SPA(s) within foraging range
Kittiwake	6865 (Jul)	*Apr–Aug*	YES	83	YES	YES	SPA(s) within foraging range
Herring gull	130 (Jun)	*Apr–Aug*	YES	61	YES	YES	SPA(s) within foraging range
Little gull	163 (Jul)	May–Jul	NO		NO	NO	No UK SPAs for this species. The July count is likely to represent post-breeding, passage birds.
Great black-backed gull	15 (Apr)	Apr–Aug	YES	n/a	NO	NO	The limited information available on foraging distances from breeding colonies suggests great black-backed gulls usually feed within 25 km; although seabirds at sea data also suggest that this species has a more maritime distribution than herring gulls during the breeding season (Harding & Riley 2000; Stone et al. 1995) implying some birds do forage far out to sea at this time. All UK SPAs for great black-backed gull are more than 240 km from Inch Cape, therefore it is considered unlikely that breeding birds from SPA populations forage within the site.
Lesser black-backed gull	44 (Jun)	May–Aug	YES	141	YES	YES	SPA(s) within foraging range.
Common tern	90 (Sept)	May–Sept	YES	26	YES	YES	SPA(s) in close proximity to foraging range. At its closest point the Forth Islands SPA (Isle of May) is 29 km from Inch Cape, just inside the maximum foraging range quoted for this species by Thaxter et al. 2012 (30 km). Common tern is a qualifying species of this SPA and in recent years the species has nested on the Isle of May (Forth Seabird Group 2012). On a precautionary basis this species has been scoped in for further consideration. The highest numbers of birds were recorded at Inch Cape towards the end of the breeding season and included both adults and juveniles (presumably recently fledged birds). At this time birds are likely to be dispersing from colonies and may travel further from nest sites or perhaps no longer returning to nesting colonies to roost. The peak count of birds in September may include common terns from other colonies besides the nearest one on the Isle of May. 30% of common terns recorded in Sept 2010 were juveniles.
Arctic tern	863 (Aug)	May–Aug	YES	24	YES	YES	SPA(s) in close proximity to foraging range. Arctic tern is a qualifying species of the Forth Islands SPA and in recent years has nested on the Isle of May (Forth Seabird Group 2012), 29 km from Inch Cape. The maximum foraging range for this species is estimated at 30 km (Thaxter et al. 2012). On a precautionary basis this species has been scoped in for further consideration. The highest numbers of Arctic terns were recorded at Inch Cape towards the end of the breeding season. At this time birds are likely to be dispersing from colonies and may travel further from nest sites or perhaps no longer return to nesting colonies to roost. 22% of Arctic terns recorded in August 2011 were juveniles.
Guillemot	15933 Jun)	*Apr–Jul*	YES	134	YES	YES	SPA(s) within foraging range
Razorbill	8272 (Jul)	*Apr–Jul*	YES	84	YES	YES	SPA(s) within foraging range
Puffin	5291 (May)	*Apr–Aug*	YES	151	YES	YES	SPA(s) within foraging range
Manx shearwater	174 (May)	May–Sept	YES	> 330	NO	NO	Although the available information on foraging range is imprecise, Inch Cape is highly likely to lie beyond the foraging range of nesting birds at all UK SPA(s), which are situated on the west coast of Scotland and Wales (Stroud et al. 2001).
Shag	[6] (Mar)	Mar–Sept	YES	15	NO	NO	No SPA(s) within foraging range

TABLE 1: SEABIRD SPECIES RECORDED DURING SURVEYS AT INCH CAPE IN THE BREEDING SEASON AND INITIAL HRA ASSESSMENT							
Species	**Peak population estimate, breeding season[1] (month)**	**Breeding Season (Months)[2]**	**UK SPA Quali-fier**	**Foraging distance (km) for connectivity[3]**	**SPA(s) within foraging range**	**Inclusion in next step of HRA process**	**Rationale**
Common gull	[4] (Aug)	May–Aug	YES	50	NO	NO	No SPA(s) within foraging range
Great skua	7 (Jun, Jul)	May–Aug	YES	86	NO	NO	No SPA(s) within foraging range
Arctic skua	13 (Jul)	May–Aug	YES	63	NO	NO	No SPA(s) within foraging range
Storm petrel	[7] (Oct)	Jul-Oct	YES	>65	NO	NO	The available information on foraging range is imprecise. Limited data provide an estimated foraging range of <120 km for Leach's storm petrel (Thaxter et al. 2011), a similar species which appears to have a more oceanic distribution than the storm petrel (Stone et al. 1995), suggesting it may forage further from breeding colonies. All UK storm petrel SPAs (on the western and northern isles of Scotland and Wales; Stroud et al. 2001) are more than about 290 km from Inch Cape (Appendix 5]. Therefore it is highly unlikely that nesting birds visit Inch Cape during the breeding season.

Notes:
1. Estimates based on peak monthly densities in the breeding season (Appendix 3), multiplied by the size of the study area (430 km^2). Raw counts are provided in square brackets for species recorded in low numbers.
2. Entries in *italics* taken based on advice provided by Marine Scotland in a request for a preliminary analysis of breeding season impacts for Forth and Tay offshore wind farms dated 26 August 2011. Others based on Kober et al. 2010.
3. Mean maximum foraging range from Thaxter *et al*. 2012 plus one standard deviation (where this does not exceed the maximum foraging range). Other sources are quoted for great black-backed gull as this species is not included in Thaxter et al, 2012.

TABLE 2: SEABIRDS RECORDED DURING SURVEYS AT INCH CAPE OUTSIDE THE BREEDING SEASON AND INITIAL HRA ASSESSMENT						
Species	Peak population estimate (and month), non-breeding[1]	Passage / additional season[2]	Wintering season[2]	UK SPA Qualifier	Inclusion in next step of HRA process	Rationale
Fulmar	203 (Dec)	n/a	Aug–Feb	YES	YES	Inch Cape lies within the predicted migration zone potentially used by fulmars breeding in the UK (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Manx shearwater	60 (Oct)	Oct-Nov	n/a	YES	NO	Inch Cape lies within the predicted migration zone potentially used by Manx shearwaters in the UK, although the majority of migration occurs along the west coast of Britain (Wright et al. 2012).
Sooty shearwater	333 (Oct)	n/a	July–Nov[2]	NO	NO	No UK SPAs for this species which breeds in the southern hemisphere.
Gannet	765 (Oct)	n/a	*Oct–Mar*	YES	YES	Inch Cape lies within the predicted migration zone potentially used by gannets breeding in the UK (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Shag	[13] (Feb)	n/a	Oct–Feb	YES	YES	Inch Cape lies within the predicted migration zone potentially used by shags breeding in the UK (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Common gull	[37]	n/a	Sep–Apr	YES	NO	Inch Cape lies within the predicted migration zone potentially used by common gulls breeding in the UK (Wright et al. 2012). However, information on movements from ringing recoveries (albeit limited; Wernham et al. 2002) suggests that it is mainly birds from the northern isles which may pass through the Forth and Tay offshore region. There are no SPAs for this species in the Northern Isles, the single Scottish SPA for breeding common gull is in north-east Scotland (Stroud et al. 2001). There are no UK SPAs for wintering common gull.
Kittiwake	3305 (Oct)	n/a	*Sep–Mar*	YES	YES	Inch Cape lies within the predicted migration zone potentially used by kittiwakes breeding in the UK (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Little gull	45 (Sept)	Aug–Nov	Dec–Apr	NO	NO	No UK SPAs for this species.
Herring gull	360 (Jan)	n/a	Sep–Mar	YES	YES	Inch Cape lies within the predicted migration zone potentially used by herring gulls that breed at UK SPAs. Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs. Most UK breeding herring gulls are sedentary or make only small winter movements but some make sea crossings. A precautionary assumption might be that 10–25% of the breeding population pass through the migration zone (Wright et al. 2012).
Great black-backed gull	188 (Oct)	n/a	Sep-Mar	YES	YES	Inch Cape lies within the predicted migration zone potentially used by great black-backed gulls that breed at UK SPAs. Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs. Most UK breeding birds are sedentary or make only small winter movements but some make sea crossings. A precautionary assumption might be that 10–25% of the breeding population pass through the migration zone (Wright et al. 2012).
Great skua	37 (Oct)	n/a	Sep-Apr	YES	YES	Inch Cape lies within the predicted migration zone potentially used by great skuas breeding in northern Scotland (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Pomarine skua	[11] (Oct)	Mar–Jun Aug–Nov	n/a	NO	NO	

TABLE 2: SEABIRDS RECORDED DURING SURVEYS AT INCH CAPE OUTSIDE THE BREEDING SEASON AND INITIAL HRA ASSESSMENT						
Species	Peak population estimate (and month), non-breeding[1]	Passage / additional season[2]	Wintering season[2]	UK SPA Qualifier	Inclusion in next step of HRA process	Rationale
Arctic skua	9 (Oct)	Sep–Nov	n/a	YES	YES	Inch Cape lies within the predicted migration zone potentially used by Arctic skuas breeding in northern Scotland (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Guillemot	8845 (Sep)	n/a?	Aug-Mar	YES	YES	Inch Cape lies within the predicted dispersive zones potentially used by guillemots breeding at UK SPAs (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Razorbill	10374 (Sep)	n/a?	Aug–Mar	YES	YES	Inch Cape lies within the predicted migration zone potentially used by razorbills breeding at UK SPAs (Wright et al. 2012). Birds recorded at Inch Cape outside the breeding season may derive from breeding populations of UK SPAs.
Puffin	5147 (Oct)	n/a?	Sep–Mar	YES	YES	Potential connectivity with SPAs. Inch Cape lies within the predicted migration/dispersal zone potentially used by puffins breeding at UK SPAs (Wright et al. 2012).
Little auk	6160 (Dec)	n/a	Nov–Mar	NO	NO	

Notes:
1. Estimates based on peak monthly densities (Appendix 3) multiplied by the size of the study area (430km^2). Raw counts are provided in square brackets for species recorded in low numbers.
2. Based on Kober et al. 2010.

TABLE 3: LIST OF NON-SEABIRD SPECIES RECORDED DURING BASELINE SURVEYS AT INCH CAPE AND INITIAL ASSESSMENT FOR INCLUSION						
Species	Peak raw count	Month of peak count	UK SPA Qualifier	Wind farm within migratory pathway to SPA(s)	Inclusion in HRA process B= breeding, NB= non-breeding	Rationale
Pink-footed goose	30	Sept	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by pink-footed geese wintering in Britain. It is recommended that migratory movements of this species should be considered in assessments for offshore wind farm developments throughout northern and eastern parts of Britain (Wright et al 2012).
Svalbard barnacle goose	338	Oct	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by Svalbard barnacle geese wintering in Britain (Wright et al. 2012, Griffin et al. 2011).
Shelduck	1	Mar	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone travelled by the majority of shelducks that winter or breed in Britain. Migration routes of shelducks through British waters are concentrated in the North Sea (British and Irish shelduck make a moult migration across the North Sea to moulting sites in the Wadden Sea) but smaller numbers probably migrate over most part of UK waters (Wright et al. 2012). The largest moulting flock in the UK is at Grangemouth in the middle Forth Estuary (Bryant 1978).
Eider	6	Apr	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by eider wintering in Britain and Ireland. Migratory birds make up a relatively small proportion of the wintering population, although east coast Scottish breeders aggregate in the Firth of Tay in winter (Wright et al. 2012).
Long-tailed duck	2	Dec	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by long-tailed duck wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary and Firth of Tay and Eden Estuary SPAs so it is possible that wintering birds may pass through Inch Cape.
Red-throated diver	3	Jan	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by red-throated divers breeding in the UK and those that migrate to Britain and Ireland during the non-breeding season. Red-throated diver (wintering) is a qualifying species of the Firth of Forth SPA.
Great northern diver	2	Nov	NO	NO	NO	

TABLE 3: LIST OF NON-SEABIRD SPECIES RECORDED DURING BASELINE SURVEYS AT INCH CAPE AND INITIAL ASSESSMENT FOR INCLUSION						
Species	Peak raw count	Month of peak count	UK SPA Qualifier	Wind farm within migratory pathway to SPA(s)	Inclusion in HRA process B= breeding, NB= non-breeding	Rationale
Oyster catcher	20	Aug	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by oystercatchers breeding in the UK and those that migrate to Britain and Ireland during the non-breeding season (Wright et al. 2012).
Ringed plover	1	Oct	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by ringed plovers breeding in the UK and those that migrate through Britain and Ireland during the non-breeding season on autumn passage (Wright et al. 2012).
Golden plover	2	Nov	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by golden plovers breeding in the UK and those that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Purple sandpiper	1	Nov	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by purple sandpipers that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Curlew	3	Jun	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by curlew breeding in the UK and those that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Grey phalarope	21	Nov	NO	NO	NO	
Wood pigeon	1	Oct	NO	NO	NO	
Feral pigeon	1	Jun	NO	NO	NO	
Meadow pipit	12	Apr	NO	NO	NO	
Pied wagtail	1	Oct	NO	NO	NO	
House martin	2	May	NO	NO	NO	
Swift	1	Jul/Aug	NO	NO	NO	
Swallow	10	Sep	NO	NO	NO	
Song thrush	7	Oct	NO	NO	NO	
Blackbird	1	Oct	NO	NO	NO	
Fieldfare	82	Oct	NO	NO	NO	
Redwing	20	Oct	NO	NO	NO	
Blackcap	1	Nov	NO	NO	NO	
Starling	5	Nov	NO	NO	NO	
Carrion crow	2	Apr	NO	NO	NO	

TABLE 4: LIST OF SEABIRD SPECIES WHICH WERE NOT RECORDED DURING BASELINE SURVEYS BUT MAY POTENTIALLY USE OR MIGRATE THROUGH INCH CAPE, AND INITIAL ASSESSMENT FOR INCLUSION				
Species[1]	**UK SPA Qualifier**	**Wind farm within migratory pathway to SPA(s)**	**Inclusion in HRA process B= breeding, NB= Non-breeding**	**Rationale**
Storm petrel (non-breeding)	YES	YES	YES, NB	Recorded at Inch Cape during the breeding season (see Table 1) but not during the non-breeding season. Inch Cape lies within the predicted migration zone potentially used by Storm Petrels that breed in the UK (Wright et al. 2012).
Leach's petrel	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by Leach's petrels that breed in the UK (Wright et al. 2012).
Black-headed gull	YES	YES	NO	Inch Cape lies within the predicted migration zone for black-headed gulls breeding at UK SPAs (Wright et al. 2012). However all UK SPAs are south of Coquet Island in north of England, and information on ringing recoveries (Wernham et al. 2002) suggests that English birds tend to move southwards in winter.
Lesser black-backed gull (non-breeding)	YES	YES	YES, NB	Inch cape lies within the predicted migration zone potentially used by lesser black-backed gulls breeding in the UK (Wright et al. 2012).
Little tern	YES	YES	YES, NB	Inch Cape is not within the foraging range of little terns (mean maximum of 9 km, Thaxter et al. 2011) nesting at any UK SPA. The site however lies within the predicted migration zone for little terns breeding at UK SPAs (Wright et al. 2012).
Sandwich tern	YES	YES	YES: B, NB	Inch Cape lies within the potential foraging range (mean maximum 49km, Thaxter et al. 2011) of Sandwich terns from the Forth Islands SPA. It also lies within the predicted migration zone for Sandwich terns breeding at UK SPAs (Wright et al. 2012). The Forth Estuary is classified as an SPA for a post-breeding aggregation of Sandwich terns.
Roseate tern	YES	YES	YES: B, NB	Inch Cape lies in close proximity to the potential foraging range (mean maximum 28 km, maximum 30km, Thaxter et al. 2011) of Roseate terns from the Forth Islands SPA. Inch Cape lies within the predicted migration zone for roseate terns breeding at UK SPAs (Wright et al. 2012).
Arctic tern (non-breeding)	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone for Arctic terns breeding at UK SPAs (Wright et al. 2012). Records of this species at Inch Cape during the late breeding season may include some passage birds (see Table 1).
Common tern (non-breeding)	YES	YES	YES (NB)	Inch Cape lies within the predicted migration zone for commonterns breeding at UK SPAs (Wright et al. 2012). Records of this species at Inch Cape during the late breeding season may include some passage birds (see Table 1).

Notes:
1. Includes some species which were recorded in Inch Cape during the breeding season only, but might be expected to pass through during the non-breeding season (e.g. Storm petrel).

TABLE 5: LIST OF NON-SEABIRD SPECIES WHICH WERE NOT RECORDED DURING BASELINE SURVEYS BUT MAY MIGRATE THROUGH INCH CAPE, AND INITIAL ASSESSMENT FOR INCLUSION				
Species	**UK SPA Qualifier**	**Wind farm within migratory pathway to SPA(s)**	**Inclusion in HRA process (B= breeding, NB = Non-breeding)**	**Rationale**
Whooper swan	YES	YES	YES, NB	Inch cape lies within the main migration zone predicted to be crossed by whooper swans wintering in Britain. It is recommended that that assessments for offshore wind farm developments in UK waters north of Wales and Norfolk should consider information on migratory movements when considering potential effects on migrating whooper Swans (Wright et al. 2012).
Taiga bean goose	YES	YES	YES, NB	Inch Cape lies within the migration zone predicted to be crossed by Bean Geese wintering in Britain (Wright et al. 2012).
Icelandic greylag goose	YES	YES	YES, NB	Inch Cape lies within the migration zone predicted to be crossed by Icelandic greylag geese wintering in Britain. It is recommended that the movements of this population should be considered in assessments for offshore wind farms around Scotland (Wright et al. 2012).
Svalbard light-bellied brent goose	YES	YES	YES, NB	Inch Cape lies within the migration zone predicted to be crossed by a proportion of the Svalbard light-bellied brent geese wintering in Britain. It is recommended that a precautionary assumption is made that up to 1000 individuals might cross the Forth/Tay region (Wright et al. 2012).
Wigeon	YES	YES	YES, NB	On a precautionary basis, Wright et al. 2012 recommend that assessments for wind farms in the North Sea should assume that the entire British and Irish wintering population could potentially cross the North Sea.
Teal	YES	YES	YES, NB	Available information suggests that teal migrate over almost all parts of UK waters (Wright et al. 2012).
Mallard	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by mallards breeding or wintering in Britain and Ireland (Wright et al. 2012).
Pintail	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by pintail breeding or wintering in Britain and Ireland (Wright et al. 2012).
Shoveler	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by shoveler breeding or wintering in Britain and Ireland (Wright et al. 2012). Most classified SPAs for this species are in England but it is possible that the Loch Leven wintering population passes through Inch Cape.
Pochard	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by pochard wintering in Britain and Ireland (Wright et al. 2012). Most classified SPAs for this species are in England but it is possible that the Loch Leven wintering population passes through Inch Cape.
Tufted duck	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by tufted duck wintering in Britain and Ireland (Wright et al. 2012). Most classified SPAs for this species are in England but it is possible that the Loch Leven wintering population passes through Inch Cape.
Scaup	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by scaup wintering in Britain and Ireland. The northerly distribution of scaup in Britain and Ireland and the fact that most migrate to Iceland, suggests that migration routes of UK waters are likely to be concentrated in northerly areas of Scotland and Ireland. (Wright et al. 2012). It is a qualifying species of the Forth Estuary SPA so it is possible that wintering birds may pass through Inch Cape.
Common scoter	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by common scoter wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary and Firth of Tay and Eden Estuary SPAs so it is possible that wintering birds may pass through Inch Cape.

TABLE 5: LIST OF NON-SEABIRD SPECIES WHICH WERE NOT RECORDED DURING BASELINE SURVEYS BUT MAY MIGRATE THROUGH INCH CAPE, AND INITIAL ASSESSMENT FOR INCLUSION				
Species	**UK SPA Qualifier**	**Wind farm within migratory pathway to SPA(s)**	**Inclusion in HRA process (B= breeding, NB = Non-breeding)**	**Rationale**
Velvet scoter	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by velvet scoter wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary and Firth of Tay and Eden Estuary SPAs so it is possible that wintering birds may pass through Inch Cape.
Goldeneye	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by goldeneye wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary, Loch Leven and Firth of Tay and Eden Estuary SPAs so it is possible that wintering birds may pass through Inch Cape.
Red-breasted merganser	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by red-breasted mergansers wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary and Firth of Tay and Eden Estuary SPAs so it is possible that wintering birds may pass through Inch Cape.
Goosander	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by male goosanders breeding in Britain to moulting sites in Norway (Wright et al. 2012). It is a qualifying species of the Firth of Tay and Eden Estuary SPA so it is possible that wintering birds may pass through Inch Cape.
Great-crested grebe	YES	YES	YES, NB	Inch Cape is within the migration zone predicted to be crossed by great-crested grebes wintering in Britain and Ireland (Wright et al. 2012). It is a qualifying species of the Forth Estuary SPA so it is possible that wintering birds may pass through Inch Cape.
Slavonian grebe	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by Slavonian grebes in Britain (Wright et al. 2012). It is a qualifying species of the Forth Estuary SPA so it is possible that wintering birds may pass through Inch Cape.
Marsh harrier	YES	YES	NO	Inch Cape is within the migration zone potentially used by Marsh harriers breeding in Britain (Wright et al. 2012). The majority of the Scottish breeding population is within the Firth of Tay and Eden Estuary SPA. Tracking studies of young marsh harriers from the Tay reedbeds suggest that birds starting their migrations moved south and west initially rather than flying out over the north sea (Highland Foundation for Wildlife 2012). This suggests that migrating birds may fly overland through south Scotland and England rather than over the North Sea.
Hen harrier	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by hen harriers breeding in Britain (Wright et al. 2012).
Osprey	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by ospreys breeding in Britain (Wright et al. 2012).
Merlin	YES	YES	NO	Inch Cape is within the migration zone potentially used by merlin visiting the UK in the non-breeding season (Wright et al. 2012). However the single UK SPA for wintering merlin is on the south coast of England and it is considered unlikely that significant numbers of birds using this site pass through Inch Cape.
Spotted crake	YES	YES	YES, NB	It is suggested that the migration zone identified for corncrake is also used for spotted crake until such time as better information on migration routes becomes available (Wright et al. 2012).
Corncrake	YES	YES	NO	Inch Cape is within the migration zone potentially used by corncrake visiting the UK in the breeding season. A precautionary assumption would be that this species could potentially migrate via most parts of UK waters (Wright et al. 2012). However because the majority of corncrakes breeding in Britain are found within the Western Isles of Scotland (O'Brien et al. 2006), it is considered highly unlikely that significant numbers migrate through the North Sea.

TABLE 5: LIST OF NON-SEABIRD SPECIES WHICH WERE NOT RECORDED DURING BASELINE SURVEYS BUT MAY MIGRATE THROUGH INCH CAPE, AND INITIAL ASSESSMENT FOR INCLUSION				
Species	**UK SPA Qualifier**	**Wind farm within migratory pathway to SPA(s)**	**Inclusion in HRA process (B= breeding, NB = Non-breeding)**	**Rationale**
Dotterel	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by dotterel visiting the UK in the breeding season (Wright et al. 2012).
Grey plover	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by grey plovers that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Lapwing	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by lapwings that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Knot	YES	YES	YES, NB	Inch Cape is within the migration zone potentially used by knots that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Sanderling	YES	YES	YES, NB	Sanderling is within the migration zone potentially used by sanderlings that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Dunlin	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone used by dunlin breeding in the UK and those that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Ruff	YES	YES	NO, NB	Inch Cape lies within the predicted migration zone potentially used by ruffs which visit the UK during the non-breeding and breeding seasons (Wright et al. 2010). However the UK population is small compared to the international population, and UK SPAs for ruff are all in England, It is considered unlikely that a significant proportion of any SPA populations pass through Inch Cape.
Snipe	YES	YES	NO	Inch Cape lies within the predicted migration zone potentially used by snipe which visit the UK during the non-breeding season (Wright et al. 2010). However only one UK SPA is designated for wintering snipe, located in the southwest of England. It is considered unlikely that significant numbers of wintering birds using this SPA pass through Inch Cape. There are no UK SPAs for breeding snipe.
Black-tailed godwit	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by black-tailed godwits which visit the UK during the non-breeding season (Wright et al. 2010).
Bar-tailed godwit	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by bar-tailed godwits which visit the UK during the non-breeding season (Wright et al. 2010).
Whimbrel	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by whimbrel which migrate through the UK during the non-breeding season (Wright et al. 2010).
Greenshank	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by greenshanks which breed within two SPAs in north Scotland. Greenshank also occur in Britain on passage but there are no SPA for passage birds (Wright et al. 2010).
Wood sandpiper	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by greenshanks which breed within three SPAs in north Scotland (wright et al. 2012).
Redshank	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by redshank breeding in the UK and those that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Turnstone	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by turnstones that visit Britain and Ireland during the non-breeding season (Wright et al. 2012).
Red-necked pharalope	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by red-necked pharalopes that breed in the UK (a single SPA on Fetlar) (Wright et al. 2012).
Short-eared owl	YES	YES	YES, NB	Inch Cape lies within the predicted migration zone potentially used by short-eared owls that breed in the UK (Wright et al. 2012).

Identifying the SPAs from which Bird Species Scoped in for HRA are Likely to Originate

Breeding Season

2.13 SPA species which show connectivity during the breeding season (i.e. birds which regularly forage within or pass through the proposed offshore wind farm site while they are nesting within an SPA) are considered to be a key ornithological issue in terms of HRA. For offshore wind farms, SNH has advised that HRAs should focus on breeding season impacts on the interests of SPA seabird breeding colonies; impacts to SPA seabirds outwith the breeding season may be considered of lesser importance but still need to be addressed, and Marine Scotland and its advisors are discussing potential approaches to this (Catriona Gall, SNH, email dated 20 April 2012 with comments on draft minutes of a meeting between the Forth and Tay Offshore Windfarm Developers Group, SNH, JNCC and Marine Scotland).

2.14 The potential for likely significant effects (LSE) to be identified for breeding species is considered higher than for bird species present during the post-breeding period or wintering period, or passing through on migration. This is because birds attending nest sites are likely to be constrained in their foraging ranges by the need to meet the energetic requirements of incubation and chick rearing as well as themselves. Birds which do not need to return regularly to a nest site to incubate eggs or provision a brood have a greater potential foraging area.

2.15 For the purposes of identifying LSE, any species recorded within the Inch Cape survey area is considered to potentially use the proposed offshore wind farm site. The seabird species for which there is potential connectivity between birds recorded at the Inch Cape survey area and breeding SPA populations are listed in Table 6. For each species, a list of seabird colony SPAs from which Inch Cape birds could derive is provided based on available information on the foraging range of that species during the breeding season.

2.16 For most seabird species there are also nesting colonies which are not classified as SPAs within foraging range of the Inch Cape survey area. Thus seabirds recorded at Inch Cape survery area are likely to include a mixture of SPA and non-SPA birds and further work will be undertaken to estimate the likely proportions of each.

Non-Breeding Season

2.17 A long list of birds has been identified which may forage or pass through Inch Cape survey area outside the breeding season. For most species further information is required to complete an assessment of LSE in relation to the proposed offshore wind farm. This is discussed further in section 3.

TABLE 6: SEABIRDS RECORDED AT INCH CAPE WITH BREEDING SEASON CONNECTIVITY TO SPAS: POPULATION ESTIMATES FOR SPAS WITHIN FORAGING RANGE[1]					
Species	**Peak population estimate [or raw count] at Inch Cape (breeding season)**	**Foraging Range (km)[1]**	**SPA**	**SPA population at classification (pairs)[2]**	**Most recent SPA population estimate[3]**
Fulmar	70	400	Buchan Ness to Collieston Coast	1765	1389 (2007)
			Calf of Eday	1955	1842 (2002)
			Cape Wrath	2300	2115 (2000)
			Copinsay	1615	1630 (2008)
			East Caithness Cliffs	15000	14202 (1999)
			Fair Isle	35210	29649 (2011)
			Forth Islands	798	832 (2010)
			Foula	46800	21106 (2000)
			Fowlsheugh	1170	193 (2009)
			Hoy	35000	19586 (2007)
			North Caithness Cliffs	14700	13237 (1999-2000)
			Noss	6350	5248 (2011)
			Rousay	1240	1030 (2009)
			Sumburgh Head	2542	233 (2009)
			Troup, Pennan and Lion's Heads	4400	1795 (2007)
			West Westray	1400	677 (2007)
Gannet	2760	354	Fair Isle	1166	4085 (2011)
			Flamborough Head and Bempton Cliffs	2501	7859 (2009)
			Forth Islands	21600	55482 (2009)
			Sule Skerry and Sule Stack	5900	4618 (Sule Stack, 2004), 1100 (Sule Skerry, 2011)
Kittiwake	6865	83	Buchan Ness to Collieston Coast	30452	14133 (2007)
			Forth Islands	8400	4962 (last complete count, 2008)
			Fowlsheugh	36650	9454 (2009)
			St Abbs Head to Fast Castle	21170	5298
Herring gull	130	61	Forth Islands	6600	3223 (2008)
			Fowlsheugh	3190	214 (2009)
			St Abbs Head to Fast Castle	1160	220 (2011, NNR only)
Lesser black-backed gull	44	141	Forth Islands	1500	2013 (last complete count, 2002)
Sandwich tern	No records	49	Forth Islands	440	0 (2010)
Common tern	90	26	Forth Islands	334	131 (2011)
			Imperial Dock Lock, Leith	558	789 (2008)
Roseate tern	No records	28	Forth Islands	8	2 (mean 2007–2011)
Arctic tern	555	31	Forth Islands	540	250 (2011)
Guillemot	15933	134	Buchan Ness to Collieston Coast	8640	20858
			Forth Islands	16000	21903 (The Lamb, 2009; other colonies, 2010)
			Fowlsheugh	56450	50556 (2009)
			St Abbs Head to Fast Castle	31750 individuals	33181 (NNR only, 2008)

TABLE 6: SEABIRDS RECORDED AT INCH CAPE WITH BREEDING SEASON CONNECTIVITY TO SPAS: POPULATION ESTIMATES FOR SPAS WITHIN FORAGING RANGE[1]					
Species	**Peak population estimate [or raw count] at Inch Cape (breeding season)**	**Foraging Range (km)[1]**	**SPA**	**SPA population at classification (pairs)[2]**	**Most recent SPA population estimate[3]**
Razorbill	8272	84	Forth Islands	1400	3469 (2011)
			Fowlsheugh	5800 individuals	4632 (2009)
			St Abbs Head to Fast Castle	2180 individuals	1687 (NNR only, 2008)
Puffin	5291	151	Forth Islands	14000	62567

Notes:

1. Mean maximum foraging range from Thaxter *et al.* 2012 plus one standard deviation (where this does not exceed the maximum foraging range). In some cases SPAs just outside this range are included on an pre-cautionary basis (e.g. if they fall within or just outside the maximum range in Thaxter et al. 2012.
2. From SPA citations on SNH sitelink (http://gateway.snh.gov.uk/sitelink/) or JNCC SPA review species accounts (http://jncc.defra.gov.uk/page-1417)
3. From Lewis et al. 2012, except for Roseate tern, Forth Seabird Group http://www.forthseabirdgroup.org.uk/

3 IDENTIFYING LIKELY SIGNIFICANT EFFECTS

3.1 In section 2, the SPAs and qualifying species with potential connectivity to the proposed Inch Cape Offshore Wind Farm site have been identified, during the breeding and non-breeding season. This section considers the potential for the Inch Cape Offshore Wind Farm to have LSE on these SPAs and qualifying species during these two periods.

Pathways for LSE: Potential Impacts of Wind Farms on Birds

3.2 Potential impacts from offshore wind farms on ornithological communities include a range of issues across different development stages, for at least the lifespan of the development and possibly beyond. Impacts can be fairly generic or species-specific, and often different across seasons, with birds from a range of different breeding colonies or wider populations potentially affected, depending on the time of year and origin of birds in a given area.

3.3 To further complicate matters, different impacts will differ in temporal and spatial magnitude, for example from disturbance through short-term construction activities to disturbance through long-term maintenance activities during the operational phase. Whereas some impacts are reversible or part-reversible, for example construction disturbance will cease after wind farm completion, and birds could habituate to turbine presence, compensating for initial displacement effects); others are clearly not, for example collision mortality, changes to local seabed sedimentation patterns, or loss of seabed loss through the presence of turbine foundations.

3.4 In addition, from an ornithological point of view, potential impacts do not have to be of a negative nature per se. The introduction of man-made structures into the water column can for example provide a stratum for colonisation by a range of organisms, potentially leading to a variety of underwater reef-like habitats, in turn attracting marine species, such as fish, higher up the food chain.

3.5 Generally speaking, five potential impact categories are used in relation to impact assessments, and considered for the three development stages, construction, operation and decommissioning:

- disturbance;
- habitat loss;
- collision risk
- displacement; and
- barrier effect.

<u>**Disturbance**</u>

3.6 Construction and decommissioning works are likely to involve noisy and potentially disturbing works such as pile driving. Turbine foundation options currently under consideration include gravity bases, and driven, suction or drilled piles. Of these, any piling operation will be expected to generate the greatest source of direct disturbance to birds, through vessel activity and above sea surface noise. Currently, it is expected that no more than two turbines will be under active construction at the same time, so the maximum number of simultaneous piling events on site is two.

3.7 As a worst case scenario such activity could result in the complete avoidance of the surrounding area out to a given range by all the individuals of one or more species for the duration of construction activity. However, a lack of specific information on the response of many bird species to noise, in particular the type, duration and severity of the impact and the speed at which birds may habituate, makes it extremely difficult to predict the level to which different species may be affected. Susceptibility to disturbance and its consequences may depend on:

- the foraging strategy of the birds involved, i.e. aerial, swimming or surface diving foragers;
- whether the birds present in the site are actively feeding or simply loafing or rafting, with the relative proportions of these activities likely to vary depending on the season;

- the period and duration of occupancy of the site and the reasons behind it, e.g. whether birds are engaged in another activity other than feeding such as resting or undergoing moult; and
- the origin of the birds involved (i.e. whether they are breeding or non-breeding birds, or temporary migrants).

3.8 Few published studies are available to inform the assessment of impacts. Leopold and Camphuysen (2007) noted that the only birds seen to be present around the Egmond aan Zee wind farm in the Netherlands at the times of (observed) pile driving were gulls (mainly lesser black-backed and herring gulls) and terns (mainly sandwich and common terns). These birds were predominantly seen in flight (i.e. in the air where they were not subjected to underwater noise). They concluded that there was little, if any effect of pile driving on the presence of gulls in the area.

3.9 Very little is known about how diving birds may respond directly to underwater noise. As species which have hearing adapted primarily for use in air, it is expected that hearing sensitivity underwater will generally be low, in comparison to that for marine mammals, for example. In addition, standard practices such as soft start procedures, would be expected to minimise any major direct noise impacts.

3.10 In contrast to impacts on birds, Leopold and Camphuysen (2007) reported marked effects on the behaviour, or presence of mackerel during pile driving. Consequently, it seems likely that for some bird species, the impacts of construction activity (especially pile driving) would occur indirectly through impacts upon the distribution of prey species.

3.11 High intensity sounds within the water column are known to have a highly significant and potentially lethal effect on certain fish species (e.g. Caltrans 2001, Thomsen et al. 2006). It is possible therefore that pile driving could influence the abundance and distribution of some prey species during construction, and potentially beyond the period of construction if fish populations are significantly affected.

3.12 However, a preliminary assessment of noise impacts on sandeels in the Moray Firth, which constitute a major resource for many of the seabirds foraging within the Inch Cape study area, has reported that these species are expected to be of low sensitivity to pile driving because they lack a swim bladder (Brown and May 2011). In combination with the comparatively localised areas across the application site where pile driving will occur within at any one time, it is considered this will tend to limit the extent of impacts.

3.13 The temporary displacement of fish prey from the immediate area may be of little consequence to birds if they are able to locate suitable foraging habitat nearby and re-populate the affected area once piling has ceased. Whilst this seems likely for many wide ranging pelagic seabird species, the extent and duration of displacement is hard to predict due to a lack of detailed study of fish movements.

3.14 Opportunistic scavenging species such as gulls and fulmar may benefit from foraging opportunities created by construction works. Individuals of these species may exploit novel foraging opportunities created by the presence of vessels or noise disturbance, bringing potential prey (dead or alive) to the surface.

3.15 The assessment of disturbance will consider the available information on the construction programme. The proposed pattern of construction of turbines, cables and associated infrastructure will provide information on likely extent of disturbance over the site. Without pre-empting the assessment it seems likely that the areas of simultaneous active work will be relatively small compared with the size of the site, and construction disturbance will be spatially limited in extent.

<u>Habitat Loss</u>

3.16 The introduction of turbine, offshore substation platforms and met mast foundations and cables can lead to a net loss of available seabed. The most likely mechanism for impacts on birds is indirect, though changes in the distribution of prey and foraging habitat.

3.17 Note that displacement of birds due to the physical presence of an offshore development, deterring species from entering the turbine array, also can lead to effective, absolute habitat loss. Displacement is considered below.

3.18 The direct loss of available habitat resulting from the worst case turbine foundations (gravity bases fitted to 213 was estimated to be less than 1 % of the total seabed area of the application site. No information is currently available on the maximum extent of inter-array cable options or the grid connection. This magnitude of seabed loss is considered unlikely to have a detectable impact on seabird species on the application site.

3.19 Indirect habitat loss could be more insidious, though specific information on the response of particular fish species of importance to birds, such as sandeels and clupeids, to wind farm arrays is lacking. Studies of noise impacts on sandeels have found these species to be of generally low sensitivity (Brown and May 2011).

3.20 Comparison of fish species composition in a wind farm site before and after construction found evidence for a high degree of variability, but no indication that these changes were influenced by the wind farm (Lindeboom et al. 2011). Leonhard and Pedersen (2006) reported that fish biomass increased considerably in the vicinity of the turbine bases due to the shelter afforded by scour protection. It is therefore difficult to assess any potential indirect impact of the proposed Inch Cape Offshore Wind Farm prior to installation.

3.21 Indirect habitat loss is not necessarily irreversible, in fact, micro-habitats supporting populations of invertebrates (e.g. molluscs, crustaceans etc.) would be expected to develop which could attract fish species which might otherwise be scarce due to lack of suitable habitat. A potential indirect effect of such habitat modification is to increase prey availability for birds by raising the carrying capacity of the area for stocks of invertebrates and fish. If there is a requirement for turbine substructures to be coated with anti-fouling treatments to inhibit the settlement and growth of macro invertebrates, then the structures are likely to be effectively neutral in terms of habitat creation within the water column.

3.22 Foundation structures might also influence tidal flow patterns and sediment dynamics, at least at a local scale. This may give rise to habitat modifications that impact on some bird species.

3.23 It appears possible that there may be a net positive effect on birds as a result of increasing prey abundance and availability. However, negative indirect effects are equally possible. For example collision risk could increase if birds are attracted to the turbines in greater numbers due to the presence of prey fish shoals around foundation structures. At present, the lack of detailed studies examining such effects preclude any further assessment, and the indirect effects of operation on prey species and foraging habitat are assumed to be neutral to positive and not expected to be represent a significant, long-term impact.

Collision Risk

3.24 Birds may collide with wind turbines and associated structures and this is almost certain to result in the death of the individual. Most studies which have attempted to measure actual collision rates have found evidence of low levels of avian mortality associated with operational wind farms, as birds are able to take avoiding action (Drewitt and Langston 2006). However there are relatively few studies of actual collision rates and assessments of potential collision risk are based on collision risk modelling. The standard model used in the United Kingdom, sometimes known as the ‘Band’ model, was developed for onshore wind farms (SNH 2000, SNH 2010) and has recently been modified for use with offshore wind farms (Band 2011).

3.25 The actual risk of collision depends on a number of factors including the location of a wind farm, the bird species using the area, weather conditions and the size and design of the wind farm including the number and size of turbines and use of lighting.

3.26 There are several types of bird movements which may influence collision risk, as reviewed by Kerlinger and Curry (2002):

- Flight height and speed variation as a consequence of weather effects. Migrants or other birds flying with tailwinds may be at greater risk because their flight height and groundspeed may be greater than would otherwise be the case, approaching rotor blades faster than with headwinds. Periods of poor visibility may also increase risk as their behaviour changes, e.g. shearwaters that usually fly below rotor height sometimes soar higher in strong winds (Kerlinger and Curry, 2002). However, flight activity may also be reduced when visibility is poor, especially at night, which would balance risks to an extent.
- Feeding movements. Regular movements of (breeding) birds to and from feeding areas are likely to be more prone to collide with a turbine (e.g. breeding terns, Everaert and Stienen 2007) than compared to other species which explore large offshore areas opportunistically through wandering behaviour.
- Flights to night roosts. These flights generally occur around sunset and sometimes involve flocks moving in times of poor visibility.
- Seasonal migration. A majority of bird migration occurs at night, in conditions of limited visibility, although migration for most species tends to take at high altitudes.

3.27 The effect of an individual loss on a population is influenced by several characteristics of the affected population, notably its size, density, recruitment rate (additions to the population through reproduction and immigration) and background mortality rate (the natural rate of losses due to death and emigration). In general, the effect of an individual lost from the population will be greater for species that are relatively long-lived and reproduce at a low rate. Most seabird species fall into this category. Conversely, the effect will often be much less for relatively short-lived species with higher reproductive rates, including some smaller gulls. Species that habitually fly at night or during low light conditions at dawn and dusk may also be at increased risk from collisions, although seaducks such as eiders and scoters have been shown to detect and avoid offshore turbines at night in both the Netherlands (Winkelman 1995) and at offshore towers at Tuno Knob in Denmark (Tulp et al. 1999).

3.28 It should be noted that disturbance/displacement and collision risk effects during the operational phase are mutually exclusive in a spatial sense, i.e. a bird that avoids the wind farm area cannot be at risk of collision with the turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid the wind farm, but habituate to it, and would then be at risk of collision. In addition, birds may generally avoid wind farms, but during periods of poor visibility may fly closer to turbines before taking avoiding action.

3.29 In general, effects of increased mortality on populations due to collisions with turbines are considered to be long-term (i.e. to persist throughout the operational wind farm's lifespan). One simplifying assumption of collision risk modelling is that collision rates do not decrease in response to losses from the population. In reality, effects may change over time due to the interplay of many factors (e.g. habituation to the presence of turbines, changes in fishing activities, climate change impacts on prey species, etc.). The modelling therefore predicts collisions on the basis that conditions at the time of pre-construction surveys are maintained.

3.30 Collision risk will be assessed using the offshore model developed by the Strategic Ornithological Support Services (SOSS) for the UK offshore wind industry (Band 2011). This model uses data on flight densities and flight heights of birds recorded during boat surveys of a given site. Avoidance rates for different species will be assessed based on the most up to date information available, noting the existing SNH guidance for onshore wind farms (SNH 2010) and continuing investigations of avoidance and collision rates by SOSS and Marine Scotland. A range of avoidance rates will be presented with evidence for the most appropriate, and the population consequences of collision mortality will be assessed.

Displacement

3.31 The potential extent to which species will be displaced from an offshore wind farm due to avoidance of turbines, and the consequent impacts on their populations, is very difficult to predict.

3.32 Displacement by operating wind turbines can exclude birds from suitable breeding, roosting, and feeding habitats around a larger area than otherwise would occur through direct habitat loss (Exo et al. 2003). Studies have shown that wind farms may indirectly affect a much larger area of up to 800 m in terrestrial habitats (Exo et al. 2003), and for offshore wind farms, some effects have been reported out to 4 km for scoters and auks (Petersen et al. 2006). Although some birds show no avoidance, others such as divers and auks appear to avoid flying or foraging to within several hundreds of meters of turbines (Kerlinger and Curry, 2002).

3.33 While comparative studies of offshore wind farms pre- and post-construction have been undertaken (e.g. Horns Rev and Nysted in Denmark, Petersen et al. 2006; the Kalmar Sound in Sweden, Petterson 2005; Egmond aan Zee, the Netherlands, Lindeboom et al. 2011), the wind farms studied have all been located in shallower depths and nearer to shore than the proposed Inch Cape Offshore Wind Farm. Consequently, a somewhat different suite of species, notably comprising wintering populations of seaduck, have been the primary targets for research on displacement effects to date. At present there is little evidence to enable prediction of displacement of seabirds from turbine arrays close to breeding colonies. Due to the differences in the marine environment and key bird species prevalent in the Inch Cape study area, previous research can guide displacement predictions, but cannot be assumed to be directly comparable to the assessment of potential effects on foraging seabirds during the breeding season.

3.34 For breeding birds, displacement-induced loss of foraging habitat may lead to a reduction in food supply within its foraging range, which in turn can lead to reduced breeding success and individual survival or abandonment of the breeding territory. Outside the breeding season the area may be used for foraging and/or moulting. The implications of such displacement at the population scale, in terms of the effect on the viability of the population, depends on the importance of the area from which birds are displaced and the capacity of alternative habitats to support displaced birds.

3.35 Long range migratory seabird species are unlikely to be significantly affected by displacement as their presence in a given (development) area is generally highly transient, with distribution probably largely steered by weather conditions and opportunistic feeding opportunities. An exception would be passage birds which annually congregate in more or less spatially explicit offshore staging areas for a period of time, prior to moving on to wintering areas (e.g. terns or little gull).

3.36 Displacement assessments for seabird species will be based on the bird densities recorded during boat surveys in the breeding and non-breeding seasons. A request from Marine Scotland for a preliminary analysis of breeding season impacts at proposed offshore wind farms within the Forth and Tay area was received in August 2011 (NIRAS 2012). Developers were asked to consider a range of displacement rates for seabirds within the wind farm footprint and a 2 km buffer: 50–100% displacement for gannet, guillemot, razorbill and puffin, and 0–50% for kittiwake and herring gull. Developers were further asked to consider a range of mortality rates (0–100%) for each displacement estimate, and to compare with available information on species mortality rates. Preliminary modelling of the effects of displacement from offshore wind farms on seabirds indicated that displacement was not likely to result in death but in changes to daily time and energy budgets of seabirds (McDonald et al. 2012). A worst case scenario would be to assume that all birds are displaced from the offshore wind farm area and that all displaced birds fail to breed, and to consider whether this is likely to result in population level effects. In combination with this, further investigations will be undertaken to consider whether 100% displacement is a realistic scenario on a species by species basis. The assessment will also consider the results of preliminary displacement modelling for guillemot by McDonald et al. (2012) and further development of this work.

<u>Barrier Effect</u>

3.37 Flight deviation as a result of any potential barrier effect caused by the presence of a wind farm may increase journey distance, and therefore represent an energetic cost to each individual (Masden *et al.* 2010). For each individual, the cost of this deviation increases in proportion to the frequency of passages across the site.

3.38 Previous studies of existing offshore wind farms have revealed that some bird species actively avoid wind farms by not flying in close proximity to them (Pettersson 2005, Petersen et al. 2006). Large wind farms may thus represent barriers to movement for some bird species including migrating wildfowl, which tend to move in large flocks along linear flight lines. A review of a number of wind farm sites indicated that wildfowl begin to take avoiding action from wind farms at between 100 – 3,000 m, with avoidance distances increasing on the darkest nights (Drewitt and Langston 2006). Avoidance in this way does however reduce collision risk.

3.39 Species that move through the site on a single occasion during migration are unlikely to bear a measurable cost in most cases, particularly as deviation may begin from a large distance away.

3.40 Pettersson (2005) showed that increased distance experienced by migratory waterfowl represented only 0.2 – 0.4% of the total migration distance from the breeding grounds to wintering areas and vice versa. Whilst this represented a likely increase in energy expenditure, it was considered highly unlikely to be significant.

3.41 However, birds are most constrained in terms of energy expenditure in the breeding season as they must return to the nest site regularly. Thus, breeding birds making multiple trips will suffer some energetic costs if they avoid travelling through wind farms even if these costs are relatively low compared to other stochastic variables, such as weather conditions or compared to energetic costs of foraging irrespective of stochastic effects (e.g. relative to spotting prey, diving, swimming etc.). If species have sufficient margin to increase energy expenditure during the breeding season while maintaining good physical condition as well as food provision levels to young in the colonies, offshore developments are unlikely to have a significant impact on bird populations. However, where such developments are sufficiently close to colonies to significantly impact flight trip duration, birds might be unable to invest sufficient time to maintain breeding success levels. Any potential impacts are likely to be species as well as site-specific, and tied to fluctuations in prey availability. Determining impacts is particularly difficult, with little information on barrier effects available, and virtually none in the context of a seabird rich area such as the Forth and Tay region with a range of important colonies.

3.42 Barrier impacts are considered unlikely to be significant for birds migrating through the Forth and Tay area or for seabirds using the area outside the breeding season. For seabirds breeding within foraging range of Inch Cape there are likely to be energetic costs if birds regularly detour around the offshore wind farm. As is the case with displacement, these might have population consequences. Assessments will consider the evidence that a given seabird species might be vulnerable to barrier effects and whether these effects are likely to be significant, in particular in comparison to potential displacement.

Screening Likely Significant Effect during the Breeding Season

3.43 SPAs and qualifying seabird species with potential connectivity to the proposed Inch Cape Offshore Wind Farm during the breeding season are considered in Table 7. For each species and site, an assessment is made for likely significant effect, taking into account the potential pathways for effects (disturbance, collision risk, displacement etc) and available evidence for these. Where there is potential for a significant effect, or a significant effect cannot be ruled out, then LSE has been identified.

3.44 As mentioned in section 1, a LSE does not imply a significant adverse impact on the integrity of an SPA but identifies a qualifying species for which further work is required in the form of an appropriate assessment.

3.45 For each site and qualifying interest a rationale for the assessment of LSE is included. A key criterion for this is a comparison of the peak numbers recorded during boat surveys of the Inch Cape survey area with the estimated SPA population. As a rule of thumb, where the peak numbers are equivalent to about 1% or more of the SPA population, a LSE has been identified. Where several SPAs for a given species are within foraging range of Inch Cape, then birds recorded on site are likely to include individuals from each SPA, plus birds nesting at any colonies within foraging range which are not classified as SPAs. As part of the appropriate assessment for Inch Cape in relation to SPAs, further work will be done to estimate the likely proportions of seabirds recorded within the study area that derive from individual SPAs and also non-SPA populations within foraging range. This assessment will also incorporate SNH advice that a proportion of seabirds observed at sea during the breeding season will be non-breeders, and that impacts on these individuals are less significant to population processes than for breeding adults. Non-breeding seabirds will include individuals that have not reached breeding age (which in some species can be recognised by plumage differences) and adult birds which do not breed in a given year. In a request to FTOWDG (Forth and Tay Offshore Wind Developers Group) for a preliminary analysis of breeding season impacts on seabirds, Marine Scotland have advised that it can be assumed that 50% of seabirds recorded at sea are not breeding birds, but that if more accurate information on the likely proportion of non-breeders is available, this may be used in preference.

3.46 A number of the SPAs for which LSE has been identified for qualifying species are also classified for internationally important assemblages of breeding seabirds. Where this is the case, LSE has also been identified for the breeding seabird assemblage (Table 7).

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Forth Islands	30	Fulmar*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for fulmars as all birds recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (all were less than 20 m above the sea surface, and 99% were less than 5 m; RPS 2012a). The peak population estimate at Inch Cape (70 individuals) is equivalent to about 4% of the Forth Islands SPA population (798 pairs at classification; Table 6). Given the close proximity of the Forth Islands to Inch Cape and uncertainty about the potential displacement and indirect impacts of offshore wind farms on this species it is not possible to conclude no LSE without further assessment (based on Marine Scotland 2012).
Forth Islands	45 (Bass Rock)	Gannet	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (2760 individuals) is equivalent to about 3% of the Forth Islands SPA population (48,065 pairs, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of the Forth Islands (Bass Rock) gannet population by more than 1% (RPS 2012). This indicates a potential for significant impacts at the population level. There is some evidence from wintering areas that gannets may be displaced from operational offshore wind farms outside the non-breeding season (Krijgsveld et al. 2012; Zucco et al. 2006). It is not known whether breeding birds are also likely to be displaced from operational wind farms within foraging range.
Forth Islands	30	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (6865 individuals) is equivalent to about 94% of the Forth Islands SPA population (3654 pairs, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of kittiwake SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012). There is potential for significant impacts at the population level.
Forth Islands	30	Herring gull*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (130 individuals) is equivalent to about 2% of the Forth Islands SPA population (3992 pairs, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of herring gull SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012). This indicates a potential for significant impacts at the population level.

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SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Forth Islands	30	Lesser black-backed gull	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (44 individuals) is equivalent to about 2% of the Forth Islands SPA population (1500 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of lesser black-backed SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012). This indicates a potential for significant impacts at the population level.
Forth Islands	30	Sandwich tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Sandwich terns were not recorded during the boat surveys at Inch Cape. The site lies within the potential foraging range of this species from the Forth Islands SPA. However Sandwich terns have declined as a breeding species in the Forth Islands, from 440 pairs (c. 1987) cited at classification, to 197 pairs in 1999-2003 (SNH 2004). These declines coincided with low numbers elsewhere in the southeast of Scotland and increased numbers in northeast Scotland, suggesting there may have been a shift in distribution (SNH 2004). During 2007-2011 only a single pair of Sandwich terns was recorded breeding in the Forth Islands (on the Isle of May in 2008) (Forth Seabird Group 2012). Thus the absence of sightings during boat surveys in the 2011 breeding season reflects the lack of breeding birds. If the SPA breeding population were to recover then it is possible that birds would forage at Inch Cape. The species has been scoped in for LSE on a precautionary basis. Sandwich terns have been recorded colliding with wind turbines (Everaert & Stienen 2007).
Forth Islands	30	Common tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate recorded during the breeding season at Inch Cape (90 individuals; 30% of all birds recorded were juveniles) is equivalent to about 24% of the Forth Islands SPA population (131 pairs 2011, Table 6). This indicates a potential for significant impacts at the population level. Common terns have been recorded colliding with wind turbines (Everaert & Stienen 2007). In recent years common terns at the Forth Islands SPA have been recorded nesting only on the Isle of May (29 km from Inch Cape) and Long Craig (85 km from Inch Cape). Given a likely foraging range of 26 km (Table 6), only birds nesting on the Isle of May are likely to travel to Inch Cape.

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SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Forth Islands	30	Roseate tern	NO		No birds were recorded during boat surveys at Inch Cape. This could potentially reflect the small number of breeding pairs present in recent years (2 pairs, 2007–2011, Table 6; Forth Seabird Group 2012). However, in recent years (and since the classification of the Forth Islands SPA) all breeding records of Roseate tern within the Forth Islands SPA have been in areas which are further from Inch Cape than the foraging range of this species (28km, Table 6) (Helen Riley, pers. comm.; note because of the rarity of this species the location of breeding birds is kept confidential). If the species were to increase in numbers in the Forth Estuary and re-occupy areas where it bred in the 1950s and 1960s (principally Fidra and Inchmickery (Sandeman 1963), 49 and 75 km from Inch Cape), it would still not be expected to forage at Inch Cape.
Forth Islands	30	Arctic tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (555 individuals; 22% of the birds recorded were juveniles) is equivalent to >100% of the Forth Islands SPA population (250 pairs in 2011, Table 6). In recent years, all Arctic terns nesting within the Forth Islands SPA have been on the Isle of May (Forth Seabird Group 2012), within foraging range of Inch Cape. There is potential for significant impacts at the population level. Terns have been recorded colliding with wind turbines (Everaert & Stienen 2007).
Forth Islands	30	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All guillemots recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 10 m above the sea surface, and >99% were less than 5m above the sea; RPS 2012a). The peak population estimate at Inch Cape (15933 individuals) is equivalent to about 50% of the Forth Islands SPA population (15742 pairs, Table 6). If guillemots are displaced by offshore wind farms, there is potential for a significant effect at population level.
Forth Islands	30	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All razorbills recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 15m above the sea surface, and 97% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (8272 individuals) is equivalent to >100% of the Forth Islands SPA population (2530 pairs, Table 6). If razorbills are displaced by offshore wind farms, there is potential for a significant effect at population level.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Forth Islands	30	Puffin	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All puffins recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 15 m above the sea surface, and 97% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (5291 individuals) is equivalent to about 4% of the Forth Islands SPA population (62231 pairs, Table 6). If puffins are displaced by offshore wind farms, there is potential for a significant effect at population level.
Forth Islands	30	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The breeding seabird assemblage includes species which have been identified for LSE in their own right (above). This makes sense because individual bird species will respond differently to potential impacts such as disturbance. For the purposes of AA, consideration will be given to any assemblage species which are not also qualifying species which may be subject to impacts.
Fowlsheugh	31	Fulmar*	ES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible as all fulmars recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (all were less than 20 m above the sea surface, and 99% were less than 5 m; RPS 2012a). The peak population estimate at Inch Cape (70 individuals) is equivalent to about 3% of the Fowlsheugh SPA population (1170 pairs at classification; Table 6). Given the close proximity of Fowlsheugh to Inch Cape and uncertainty about the potential displacement and indirect impacts of offshore wind farms on Fulmar it is not possible to conclude no LSE without further assessment (based on Marine Scotland 2012).
Fowlsheugh	31	Kittiwake	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (6865 individuals) is equivalent to about 9% of the Fowlsheugh SPA population (36650 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of kittiwake SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012a). There is potential for significant impacts at the population level.

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SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Fowlsheugh	31	Herring gull*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (130 individuals) is equivalent to about 2% of the Fowlsheugh SPA population (3190 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of herring gull SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012). There is potential for significant impacts at the population level.
Fowlsheugh	31	Guillemot	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All guillemots recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 10 m above the sea surface, and >99% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (15933 individuals) is equivalent to about 14% of the Fowlsheugh SPA population (56450 pairs at classification, Table 6). If guillemots are displaced by offshore wind farms, there is potential for a significant effect at population level.
Fowlsheugh	31	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All razorbills recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 15 m above the sea surface, and 97% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (8272 individuals) is equivalent to >100% of the Fowlsheugh SPA population (5800 individuals at classification, Table 6). If razorbills are displaced by offshore wind farms, there is potential for a significant effect at population level.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Fowlsheugh	31	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The breeding seabird assemblage includes species which have been identified for LSE in their own right (above). This makes sense because individual bird species will respond differently to potential impacts such as disturbance. For the purposes of AA, consideration will be given to any assemblage species which are not also qualifying species which may be subject to impacts.
St Abbs Head to Fast Castle	50	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (6865 individuals) is equivalent to about 16% of the St Abbs Head SPA population (21170 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of kittiwake SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012a). There is potential for significant impacts at the population level.
St Abbs Head to Fast Castle	50	Herring gull*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The peak population estimate at Inch Cape (130 individuals) is equivalent to about 5% of the St Abbs Head SPA population (1160 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of herring gull SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012). There is potential for significant impacts at the population level.
St Abbs Head to Fast Castle	50	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All guillemots recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 10 m above the sea surface, and >99% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (15933 individuals) is equivalent to about 50% of the St Abbs Head SPA population (31750 individuals at classification, Table 6). If guillemots are displaced by offshore wind farms, there is potential for a significant effect at population level.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
St Abbs Head to Fast Castle	50	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All razorbills recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 15 m above the sea surface, and 97% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (8272 individuals) is equivalent to >100% of the St Abbs Head SPA population (2180 individuals at classification, Table 6). If razorbills are displaced by offshore wind farms, there is potential for a significant effect at population level.
St Abbs Head to Fast Castle	50	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The breeding seabird assemblages include species which have been identified for LSE in their own right (above). This makes sense because individual bird species will respond differently to potential impacts such as disturbance. For the purposes of AA, consideration will be given to any assemblage species which are not also qualifying species which may be subject to impacts.
Imperial Dock Lock, Leith	83	Common tern	NO		Given a likely foraging range of 26 km and a maximum of 30 km (Thaxter et al. 2011), common terns nesting at Leith Docks are unlikely to travel to Inch Cape. Individual tracking studies of common terns from Leith Docks in June and July 2009 indicated that on 144 foraging trips, no birds travelled as far as Inch Cape (Wilson et al. 2009).
Buchan Ness to Collieston Coast	82	Fulmar*	YES	• Displacement • Disturbance • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible as all fulmars recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (all were less than 20 m above the sea surface, and 99% were less than 5 m; RPS 2012a). The peak population estimate at Inch Cape (70 individuals) is equivalent to about 2% of the Buchan Ness SPA population (1765 pairs at classification; Table 6). The SPA is >100 km from Inch Cape and it is likely that only a small proportion (if any) of the birds recorded during surveys originate from Buchan Ness. However given uncertainty about the potential displacement and indirect impacts of offshore wind farms on Fulmar it is not possible to conclude no LSE without further assessment (based on Marine Scotland 2012).
Buchan Ness to Collieston	82	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The distance between the SPA and Inch Cape exceeds mean maximum foraging range for this species (83 km, Thaxter et al 2011) but LSE has been identified on a precautionary basis. The peak population estimate at Inch Cape (6865 individuals) is equivalent to about 11% of the Buchan Ness SPA population (30452 pairs at classification, Table 6). Preliminary collision risk estimates at 98% avoidance (as recommended by SNH and JNCC) indicate the potential for collisions with turbines to increase the mortality rate of kittiwake SPA populations within foraging range of Inch Cape by more than 1% (RPS 2012a). There is potential for significant impacts at the population level.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Buchan Ness to Collieston	82	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	Collision risk is considered negligible for this species. All guillemots recorded during Inch Cape boat surveys flew below the predicted lower blade tip height for turbines (no birds flew more than 10 m above the sea surface, and >99% were less than 5 m above the sea; RPS 2012a). The peak population estimate at Inch Cape (15933 individuals) is equivalent to about 92% of the Buchan Ness SPA population (8640 pairs at classification, Table 6). If guillemots are displaced by offshore wind farms, there is potential for a significant effect at population level.
Buchan Ness to Collieston	82	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	The breeding seabird assemblages include species which have been identified for LSE in their own right (above). This makes sense because individual bird species will respond differently to potential impacts such as disturbance. For the purposes of AA, consideration will be given to any assemblage species which are not also qualifying species which may be subject to impacts.
Troup, Pennan & Lion's Heads	143	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <1% of the SPA population (4400 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
North Caithness Cliffs	257	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.3% of the SPA population (14,700 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
East Caithness Cliffs	231	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.3% of the SPA population (15000 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Hoy	283	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.2% of the SPA population (35000 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Copinsay	281	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to 2% of the SPA population (1615 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Cape Wrath	371	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to about 2% of the SPA population (2300 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Flamborough Head & Bempton Cliffs	301	Gannet*	NO		Based on a mean maximum foraging range of 354 km (Thaxter et al. 2011) it is considered unlikely that significant numbers of nesting birds from the SPA would travel to Inch Cape on foraging trips. Tracking data collected by RSPB for gannets at Bempton Cliffs support this conclusion (cited in Hamer et al. 2011)
Rousay	322	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to about 3% of the SPA population (1240 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Calf of Eday	319	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to about 2% of the SPA population (1955 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
West Westray	331	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to about 3% of the SPA population (1400 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.

TABLE 7: INCH CAPE: SPAS AND QUALIFYING SPECIES WITH POTENTIAL BREEDING SEASON CONNECTIVITY TO BE ASSESSED FOR LIKELY SIGNIFICANT EFFECTS					
SPA (in order of distance from Inch Cape)	**Distance from Inch Cape (km)[1]**	**Qualifying species with potential connectivity (* identifies species which are listed as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Sule Skerry & Sule Stack	361	Gannet	NO		Based on a mean maximum foraging range of 354 km (Thaxter et al. 2011) it is considered unlikely that significant numbers of nesting birds from Sule Skerry and Sule Stack would travel to Inch Cape on foraging trips.
Fair Isle	329	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.1% of the SPA population (35210 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Fair Isle	329	Gannet*	NO		Based on a mean maximum foraging range of 354 km (Thaxter et al. 2011) it is considered unlikely that significant numbers of nesting birds from Fair Isle would travel to Inch Cape on foraging trips.
Sumburgh Head	377	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to about 1% of the SPA population (2542 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Foula	401	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.1% of the SPA population (46800 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.
Noss	414	Fulmar*	NO		The peak population estimate at Inch Cape (70 individuals) is equivalent to <0.5% of the SPA population (6350 pairs at classification; Table 6). Although Inch Cape is within the potential foraging range of fulmars from the SPA, given the distance, the small number of birds recorded at Inch Cape in relation to the SPA population, and the presence of several fulmar colonies closer to Inch Cape, significant impacts are considered unlikely.

Notes:
1. Distances are the shortest route by sea avoiding an overland crossing (see also Appendix 5) between the SPA boundary and the boundary of the Inch Cape survey area

Screening Likely Significant Effect during the Non-Breeding Season

3.47 A large number of bird species have been identified which may pass through the proposed Inch Cape Offshore Wind Farm outside the breeding season. This includes seabird species which may forage over the area and seabirds and non-seabirds which may pass through on migration. For most species further information is required to complete an assessment of likely significant effect in relation to the proposed Inch Cape Offshore Wind Farm and in most cases is not possible to conclude no LSE at this stage. The bird species involved are listed in Tables 8 (seabirds) and 9 (non-seabirds). In each case, LSE is identified on a precautionary basis where this cannot be ruled out, and information is provided on further work required to complete the HRA for the proposed Inch Cape Offshore Wind Farm.

3.48 For many seabirds and migratory bird species, networks of SPAs have been designated in Scotland and the UK for wintering, passage and/or breeding populations and further assessment is required to identify the sites potentially used by birds present or passing through Inch Cape outside the breeding season. Thus for many species, specific SPAs have not been identified.

TABLE 8: INCH CAPE: LIST OF SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Peak non-breeding population estimate at Inch Cape**	**Potential impact (s)**	**Likely Significant Effect?**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Fulmar	203		NO	Flight height data from Inch Cape indicate that the majority (99% of 339 records) of fulmars recorded at Inch Cape flew less than 5 m above sea level (RPS 2012a). Collision risk is therefore considered to be negligible for this species. Fulmars from UK breeding sites disperse in all directions during the non-breeding season, although many continue to attend colonies throughout the year (Wright et al. 2012). During the breeding season, fulmars may travel more than 400 km from colonies to forage (Thaxter et al. 2012). They are expected to range more widely during the non-breeding season and potentially exploit vast areas of marine habitat. Thus even if birds are displaced from Inch Cape outside the breeding season it is predicted that sufficient alternative habitat is available. Barrier effects are also not predicted because of the small size of the Inch Cape wind farm area compared to the migration zone potentially exploited by fulmars breeding in Britain and Ireland (Wright et al. 2012). No estimate is available for the number of fulmars potentially wintering in UK waters. If all birds from the UK breeding population also winter in UK waters (504,756 pairs, Wright et al 2012) the peak non-breeding population estimate for Inch Cape would represent <0.03% of this total. Inch Cape also does not overlap with areas of high density for fulmar during the winter identified from seabirds at sea survey data (Kober et al. 2010, Figure 29b)
Gannet	765	• Collision risk	YES	Gannets migrate south at the end of the breeding season. Tracking of birds from Bass Rock indicated that most (82% of 22 birds) spent the winter beyond the North Sea and English Channel, off West Africa, in the Mediterranean Sea, the Bay of Biscay or the Celtic Sea; birds left between the end of September and the middle of October and returned between the end of January and mid-February (Hamer et al 2011, Kubetzki et al. 2009). If birds migrate through Inch Cape then they may be at risk of collision with turbines. Population estimates from boat surveys at Inch Cape were substantially lower in the non-breeding season (RPS 2012a, Figure 3.5), although it is not known what proportion of the birds observed are likely to derive from Bass Rock and what proportion come from other breeding colonies. During the breeding season, gannets may travel more than 350 km from colonies to forage (Thaxter et al. 2012). They are expected to range more widely during the non-breeding season and potentially exploit vast areas of marine habitat. Thus even if birds are displaced from Inch Cape outside the breeding season it is predicted that sufficient alternative habitat is available. Barrier effects are also not predicted because of the small size of the Inch Cape wind farm area compared to the migration zone potentially used by gannets breeding in Britain and Ireland (Wright et al. 2012).
Shag	[7]		NO	Shags forage close to the shore throughout the year. Some birds disperse widely outside the breeding season but many remain within 50–100km of breeding colonies throughout the year (Wright et al. 2012). The wintering population in UK waters is estimated at 110000 individuals (Musgrove et al. 2011). The peak non-breeding count for Inch Cape would represent <0.01% of this total. If all birds from the Forth Islands SPA population (1088 pairs in 2010, Lewis et al. 2012) winter in nearby waters then the peak count of 7 birds represents <0.4% of the SPA population. Of 20 birds recorded in flight, none flew above 5 m.
Kittiwake	3305	• Collision risk	YES	In the non-breeding season, estimated kittiwake numbers at Inch Cape were highest in October which may represent a post-breeding concentration of birds from local breeding colonies; this number exceeds 1% of the populations of SPA within foraging range (RPS 2012a, Figure 3.8). Lower numbers were recorded between November and March. Birds passing through Inch Cape may be at risk of collision with turbines. Of all birds recorded in flight 4.8% were seen flying at potential collision height (30m and above). During the breeding season, kittiwakes may travel more than 80 km from colonies to forage (Thaxter et al. 2012). They are expected to range more widely during the non-breeding season so even if birds are displaced from Inch Cape at this time it is likely that sufficient alternative habitat is available. Barrier effects are also not predicted because of the small size of the Inch Cape wind farm area compared to the migration zone potentially used by kittiwakes breeding in Britain and Ireland (Wright et al. 2012).

TABLE 8: INCH CAPE: LIST OF SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Peak non-breeding population estimate at Inch Cape**	**Potential impact (s)**	**Likely Significant Effect?**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Herring gull	360	• Collision risk	YES	The peak population estimate of herring gulls at Inch Cape was recorded outside the breeding season, in mid-winter. This may include birds from local SPA breeding populations and birds from other UK SPAs migrating through Inch Cape which may be at risk of collision with turbines (20.3% of all birds in flight were seen flying at or above 30 m height). Herring gulls may travel more than 60 km from colonies to forage (Thaxter et al. 2012). They are expected to range more widely during the non-breeding season so even if birds are displaced from Inch Cape at this time it is likely that sufficient alternative habitat is available. Barrier effects are also not predicted because of the small size of the Inch Cape wind farm area compared to the migration zone potentially used by herring gulls breeding in Britain and Ireland (Wright et al. 2012).
Great black-backed gull	208	• Collision risk	YES	The peak population estimate of great black-backed gulls at Inch Cape was recorded outside the breeding season, in October. There are no local SPA populations but this may include birds from other UK SPAs migrating through Inch Cape which may be at risk of collision with turbines (31.4% of all birds in flight were seen flying at or above 30 m height). Disturbance and displacement effects are not predicted because of the small numbers of birds recorded at Inch Cape compared to the UK wintering population (76,000 individuals, Musgrove et al. 2011) and the potential for birds to utilise alternative areas. Barrier effects are not predicted because of the small size of the Inch Cape wind farm area compared to the migration zone potentially used by Great black-backed gulls breeding in Britain and Ireland (Wright et al. 2012).
Great skua	37	• Collision risk	YES	Great skuas breed in the north of Scotland (Mitchell et al. 2004; Furness 2007a). Passage birds from Scottish and more northerly breeding colonies are seen most commonly in autumn along the east coast. The main wintering areas are from the Celtic Sea to the Atlantic Ocean off the West coast of Africa and the Western Mediterranean (Furness 2007a). Systematic coastal observations and satellite tracking suggest that great skuas normally use the north sea for when migrating south in autumn. Some birds pass overland from the North Sea to the Atlantic via the Moray Firth and the Firth of Forth (Furness 2007a). Spring passage migration is mainly along the west coast rather than the North Sea (Furness 2007b). Peak numbers at Inch Cape were recorded in October. Passage birds from breeding colonies at SPAs in Orkney and Shetland may migrate through Inch Cape and be at risk of collision with turbines. Disturbance and displacement are not predicted because of the small numbers of birds recorded at Inch Cape and the potential for birds to utilise alternative areas.
Arctic skua	9	• Collision risk	YES	Arctic skuas breed in the north of Scotland (Mitchell et al. 2004; Furness 2007b). Passage birds from Scottish and more northerly breeding colonies are seen most commonly in autumn off the east coast, using inshore waters. Some birds pass overland from the North Sea to the Atlantic via the Moray Firth and the Firth of Forth. Spring passage migration is mainly along the west coast rather than the North Sea (Furness 2007b). Passage birds from breeding colonies at SPAs in Orkney and Shetland may migrate through Inch Cape and be at risk of collision with turbines. Disturbance and displacement are not predicted because of the small numbers of birds recorded at Inch Cape and the potential for birds to utilise alternative areas.
Arctic tern	555	• Collision risk	YES	Arctic terns breeding in Scotland usually leave nesting sites by mid-August and may migrate southwards through the North Sea or off the west coast. Aggregations of several hundred terns may remain in Scottish Coastal areas for 1–2 weeks where suitable feeding habitat exists, including the Firth of Forth (Craik 2007a). The peak count of birds at Inch Cape was in August 2011; although this is defined as within the breeding season by Kober et al. 2010, this may include some passage birds. As well as birds from the Forth Islands SPA, birds from SPA breeding colonies in the Northern Isles may pass through Inch Cape and be at risk of collision with turbines. Disturbance and displacement are not predicted because of the potential for passage birds to utilise alternative areas.

TABLE 8: INCH CAPE: LIST OF SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Peak non-breeding population estimate at Inch Cape**	**Potential impact (s)**	**Likely Significant Effect?**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Common tern	90	• Collision risk	YES	Many common tern breeding sites in Scotland are empty by mid August, although laying may sometimes extend into August with young fledging as late as mid-September. In late summer and autumn, flocks of several birds may occur on passage along the east and west coast of Scotland, and aggregations of common terns may linger in coastal waters in food rich areas including the Firth of Forth (Craik 2007b The peak count of birds at Inch Cape was in September 2010; although this is defined as within the breeding season by Kober et al. 2010, this may include some passage birds. As well as birds from the Forth Islands SPA, birds from other UK SPAs might pass through the area on migration and be at risk of collision. Disturbance and displacement are not predicted because of the potential for birds to utilise alternative areas.
Guillemot	8824		NO	Guillemots breeding at sites around Britain and Ireland disperse into surrounding seas outside the breeding season (Wright et al. 2012). At this time collision risk is not considered an issue as guillemots were not seen flying more than 10m above the water surface (RPS 2012a). Chicks are flightless for a period after leaving the nest and adult guillemots moult into winter plumage after breeding and are also flightless for a while. Relatively high densities of guillemots occur in extensive areas of east coast Scottish waters between August and March (Kober et al. 2010; Stone et al. 1995). Studies in Denmark have reported post-construction avoidance of wind farms by auks (Petersen et al. 2006). Even if all birds are displaced from Inch Cape, it is considered that sufficient areas of alternative habitat remain for non-breeding birds which are not constrained in their foraging range by the requirement to attend a nest site.
Razorbill	10374		NO	Razorbills breeding in the UK tend to migrate southwards after the breeding season, although some may make more local movements and remain close to breeding colonies throughout the year (Wright et al. 2012; Lauder 2007; Stone et al. 1995). Chicks leave nests before they can fly and adults are flightless during the moult period after breeding. Collision risk is not considered an issue outside the breeding season as razorbills were not seen flying more than 15m above the water surface (RPS 2012a). Studies in Denmark have reported post-construction avoidance of wind farms by auks (Petersen et al. 2006). Even if all razorbills are displaced from Inch Cape, it is considered that sufficient areas of alternative habitat remain for non-breeding birds which are not constrained in their foraging range by the requirement to attend a nest site.
Puffin	5136		NO	Movements of puffins outside the breeding season are poorly understood, although they are thought to be dispersive rather than following migratory routes (Wright et al. 2012). Recent deployment of geolocators from adults on the Isle of May has shown that some birds move around the north coast of Scotland into the Atlantic, whereas others remain in the North Sea throughout the winter (Harris & Wanless 2011). Puffins undergo wing moult outside the breeding period and are flightless for a period. Collision risk is not considered an issue outside the breeding season as puffins were rarely seen flying more than 5m above the water surface (RPS 2012a). Studies in Denmark have reported post-construction avoidance of wind farms by auks (Petersen et al. 2006). Even if all puffins are displaced from Inch Cape, it is considered that sufficient areas of alternative habitat remain for non-breeding birds which are not constrained in their foraging range by the requirement to attend a nest site.

TABLE 8: INCH CAPE: LIST OF SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Peak non-breeding population estimate at Inch Cape**	**Potential impact (s)**	**Likely Significant Effect?**	**Rationale (References to Inch Cape are to the Inch Cape survey area)**
Storm petrel	[7]	• Collision risk	YES	Storm petrels are pelagic outside the breeding season. They may disperse in any direction from UK breeding colonies to feeding areas. Birds may move south during the late summer and autumn and winter off the coast of western and southern Africa (Wright et al. 2012). Storm petrels were not recorded at Inch Cape outside the breeding season but they may be active at night and pass through on migration and potentially be at collision risk from turbines. Limited data is available to assess the flight heights of storm petrels. Studies at two offshore wind farms in the UK found that only 2% of birds were recorded flying at potential collision height with turbines (Cook et al. 2011). Storm petrels were at Inch Cape only in October 2011; although this is defined as within the breeding season by Kober et al. 2010, this may comprise passage birds. On a precautionary basis the species has been scoped in for further consideration of potential collision risk. Disturbance and displacement are not considered an issue for this species given its wide-ranging behaviour and the likely availability of areas of alternative habitat.
Leach's petrel	Not recorded during Inch Cape boat surveys		NO	Although Inch Cape lies within the potential migration zone for Leach's petrels breeding in the UK (Wright et al. 2012), the majority of observations of passage migrants are from the west coast (Tasker 2007). Maps of the distribution of this species at sea throughout the year (Stone et al. 1995) do not indicate that the outer Forth area is of importance for this species. It is not anticipated that large numbers of this species pass through Inch Cape.
Lesser black-backed gull	Not recorded during Inch Cape boat surveys outside the breeding season	• Collision risk	YES	The majority of lesser black-backed gulls breeding in the UK migrate south to winter in coastal areas of Iberia and north-west Africa (Wright et al. 2012), and none were recorded during Inch Cape bird surveys outside the breeding season, therefore birds are not predicted to be subject to displacement or disturbance at this time. LSE has been identified on a precautionary basis as birds migrating south might be at risk of collision if they pass through Inch Cape. The Forth Islands is the most northerly SPA for this species in the UK, so only SPA breeding birds from here are likely to pass through Inch Cape on migration. Boat surveys did not pick up large numbers of this species during passage periods, although it is possible that such movements may have been missed.. Tracking of lesser black-backed gulls breeding at Orforness in southern England has shown that migrating birds initially move inland before crossing the English Channel to northern France (BTO 2012). It is possible that birds nesting at the Forth Islands might also move inland rather than migrate through the North Sea – although no information on this has been found at the time of writing.
Little tern	Not recorded during Inch Cape boat surveys	• Collision risk	YES	Little terns breeding in the UK migrate to wintering sites off western Africa. The precise routes taken and the timing of migration are poorly understood (Wright et al. 2012). It is possible that birds breeding at UK SPAs may migrate through Inch Cape and be at risk of collision with turbines. The species has been scoped in for LSE on a precautionary basis.
Sandwich tern	Not recorded during Inch Cape boat surveys	• Collision risk	YES	Sandwich terns breeding in the UK migrate to wintering sites off western Africa. After breeding, birds disperse around the coasts of Britain and Ireland and across the North Sea to the Netherlands and Denmark (Wright et al. 2012). There is a regular post-breeding aggregation in the Firth of Forth and the species is a qualifying feature of the Firth of Forth SPA during the passage period. It is possible that birds breeding at UK SPAs may migrate through Inch Cape and be at risk of collision with turbines. The species has been scoped in for LSE on a precautionary basis.
Roseate tern	Not recorded during Inch Cape boat surveys	• Collision risk	YES	Roseate terns breeding in the UK migrate to wintering sites off western Africa (Wright et al. 2012). The Forth Islands is the most northerly and the only Scottish SPA for this species although birds from outside Scotland may visit the Firth of Forth on passage (Fairlamb 2007). It is possible that birds breeding at UK SPAs may migrate through Inch Cape and be at risk of collision with turbines. The species has been scoped in for LSE on a precautionary basis.

TABLE 9: INCH CAPE: LIST OF NON-SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Recorded at Inch Cape survey area?**	**Potential impact (s)**	**Likely Signifi-cant Effect?**	**Further work required**
Pink-footed goose	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Svalbard barnacle goose	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	NO	Potential collision risk has been calculated by SNH for the population wintering on the Upper Solway Flats and Marshes SPA in relation to proposed offshore wind farms in the Outer Forth and Tay (spreadsheet sent by email from Catriona Gall, SNH Renewable energy Casework Advisor, 29 March 2011). Collision risk is not considered to be significant for this species.
Shelduck	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Eider	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Long-tailed duck	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Red-throated diver	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Oystercatcher	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Ringed plover	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Golden plover	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Purple sandpiper	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Curlew	YES	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Whooper swan	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	There are 20 SPAs for wintering Whooper swans in the UK (11 in Scotland). Further assessment of migratory movements (e.g. Griffin et al. 2010a + b cited in Wright et al. 2012) is required to identify whether significant numbers of birds may migrate through Inch Cape on a regular basis and which sites these birds may originate from. Potential migratory passage rate and collision risk can be calculated based on methods set out in Wright et al. (2012)
Taiga Bean goose	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Icelandic greylag goose	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)

TABLE 9: INCH CAPE: LIST OF NON-SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Recorded at Inch Cape survey area?**	**Potential impact (s)**	**Likely Signifi-cant Effect?**	**Further work required**
Svalbard light-bellied brent goose	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Wigeon	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Teal	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Mallard	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Pintail	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Shoveler	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Pochard	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012).
Tufted duck	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Scaup	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Common scoter	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Velvet scoter	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Goldeneye	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Red-breasted merganser	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Goosander	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Great-crested grebe	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Slavonian grebe	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)

TABLE 9: INCH CAPE: LIST OF NON-SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Recorded at Inch Cape survey area?**	**Potential impact (s)**	**Likely Signifi-cant Effect?**	**Further work required**
Hen harrier	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Osprey	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Spotted crake	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Dotterel	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Grey plover	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Lapwing	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Knot	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Sanderling	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Dunlin	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Black-tailed godwit	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Bar-tailed godwit	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Whimbrel	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Greenshank	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Wood sandpiper	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Redshank	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Turnstone	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)

TABLE 9: INCH CAPE: LIST OF NON-SEABIRD SPECIES FOR WHICH THERE IS POTENTIAL CONNECTIVITY WITH SPA POPULATIONS DURING THE NON-BREEDING SEASON AND PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECT				
Species	**Recorded at Inch Cape survey area?**	**Potential impact (s)**	**Likely Signifi-cant Effect?**	**Further work required**
Red-necked pharalope	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)
Short-eared owl	NO	Collision risk (migrating birds) Barrier effect (migrating birds)	YES	Calculate potential migratory passage rate and collision risk based on methods set out in Wright et al. (2012)

4 CONCLUSIONS: SPAS AND QUALIFYING SPECIES IDENTIFIED FOR APPROPRIATE ASSESSMENT

4.1 This section summarises the findings of the HRA screening for the proposed Inch Cape Offshore Wind Farm.

Breeding Season

4.2 For the breeding season, LSE has been identified for four SPAs: Forth Islands, Fowlsheugh, St. Abbs Head to Fast Castle and Buchan Ness to Collieston Coast. The sites, qualifying species and potential pathways for impact are listed in Table 10. It is concluded that an Appropriate Assessment (AA) will be required for all of these sites.

4.3 The AA will consider the likely numbers of birds from each SPA colony and non-SPA colonies within foraging range of Inch Cape present on the site during the breeding season, as well as the proportion of birds which are likely to be breeding adults.

TABLE 10: INCH CAPE: SPAS AND QUALIFYING SPECIES FOR WHICH LIKELY SIGNIFICANT EFFECTY HAS BEEN IDENTIFIED DURING THE BREEDING SEASON

SPA (in order of distance from the proposed Inch Cape Offshore Wind Farm)	Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)	Potential for LSE during the breeding season	Potential impacts
Forth Islands	Fulmar*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Gannet	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Herring gull*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Lesser black-backed gull	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Sandwich tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Common tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Arctic tern	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply

TABLE 10: INCH CAPE: SPAS AND QUALIFYING SPECIES FOR WHICH LIKELY SIGNIFICANT EFFECTY HAS BEEN IDENTIFIED DURING THE BREEDING SEASON			
SPA (in order of distance from the proposed Inch Cape Offshore Wind Farm)	**Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**
Forth Islands	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Puffin	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Forth Islands	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Fulmar*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Kittiwake	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Herring gull*		• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Guillemot	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Fowlsheugh	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
St Abbs Head to Fast Castle	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
St Abbs Head to Fast Castle	Herring gull*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
St Abbs Head to Fast Castle	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
St Abbs Head to Fast Castle	Razorbill*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply

TABLE 10: INCH CAPE: SPAS AND QUALIFYING SPECIES FOR WHICH LIKELY SIGNIFICANT EFFECTY HAS BEEN IDENTIFIED DURING THE BREEDING SEASON			
SPA (in order of distance from the proposed Inch Cape Offshore Wind Farm)	**Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)**	**Potential for LSE during the breeding season**	**Potential impacts**
St Abbs Head to Fast Castle	Breeding Seabird Assemblage	ES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Buchan Ness to Collieston Coast	Fulmar*	YES	• Displacement • Disturbance • Barrier effect • Indirect impacts on food supply
Buchan Ness to Collieston	Kittiwake*	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Buchan Ness to Collieston	Guillemot*	YES	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply
Buchan Ness to Collieston	Breeding Seabird Assemblage	YES	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply

4.4 The AA will include an assessment of the potential impacts as outlined in section 3 for collision risk, disturbance, displacement, barrier effect and indirect impacts. Assessments will take account of published and ongoing research into birds and offshore wind farms, including work by the Forth and Tay Offshore Wind Farm Developers Group, SOSS and Marine Scotland. The potential scale of each impact will be considered in relation to the conservation objectives of each SPA, to determine whether a significant adverse impact on site integrity is predicted.

In Combination Assessment

4.5 For the four SPAs identified for LSE, potential impacts of the proposed Inch Cape Offshore Wind Farm will be considered in combination with constructed and proposed offshore wind farms within foraging range of each SPA, as well as other major coastal developments in the Forth and Tay area. A list of developments to be considered is included in Table 11 (based on Seagreen, 2011). This includes the onshore grid connection for Inch Cape, as elements of the project will be the subject of a separate planning application to the offshore wind farm. The locations of all developments and the relevant SPAs are shown in Figure 2.

TABLE 11: INCH CAPE: PROJECTS IDENTIFIED FOR POSSIBLE INCLUSION IN THE IN COMBINATION ASSESSMENT			
Project (in order of distance from Inch Cape proposed Offshore Wind Farm)	**Distance from Inch Cape (km)**	**Details**	**Status**
Firth of Forth Round 3 Phase I	2	154–299 Turbines Development area 597 km^2	Scoping
Firth of Forth Round 3 Phases 2 and 3	1	522–725 Turbines 1680 km^2	Scoping
Neart na Gaoithe Offshore Wind Farm	10	75–125 Turbines Development area 105 km^2	Application submitted July 2012
Firth of Forth Round 3 Phase I, onshore transmission	22	Onshore cable and substation	Scoping
Dundee Waterfront Development	38	Mixed use – Commercial / Exhibition / Recreation	Different plots at different stages of development

TABLE 11: INCH CAPE: PROJECTS IDENTIFIED FOR POSSIBLE INCLUSION IN THE IN COMBINATION ASSESSMENT			
Project (in order of distance from Inch Cape proposed Offshore Wind Farm)	**Distance from Inch Cape (km)**	**Details**	**Status**
Neart na Gaoithe Onshore Transmission	52	Onshore cable and substation	Application submitted July 2012
Firth of Forth Round 3 Phase 2/3, Onshore transmission	52	Onshore cable and substation	Scoping
Aberdeen Offshore Wind Farm	68	11 Turbines	Application submitted August 2012
Inch Cape Onshore transmission	68	Onshore cable and substation	Pre-scoping
Edinburgh Waterfront Development	75	Mixed use – commercial and residential	Different plots at different stages of development
Forth Replacement Crossing	86	Cable-stayed Bridge over the inner Forth Estuary	In construction
Blyth Offshore Wind Farm	148	2 turbines	Operational
Moray Firth Round 3	169	*c.* 200 Turbines 520 km^2	Application submitted August 2012
Beatrice Demonstrator	175	2 Turbines	Operational
Beatrice Offshore Wind Farm	181	142–277 Turbines Development area 131.5 km^2	Application submitted April 2012

4.6 In combination impacts may also be considered to fall into the categories of:

- Collision mortality;
- Disturbance
- Displacement
- Barrier effect
- Indirect impacts on food supply

4.7 For the purposes of in-combination assessment, it will be necessary to consider only developments within the foraging range of seabirds which breed at each SPAs identified for LSE in relation to Inch Cape during the breeding season. The sites and qualifying species are identified in Table 10.

4.8 In combination collision mortality is only considered to a risk for bird species identified as vulnerable to collision (mainly because of flight height), and in relation to other offshore wind farms. Thus the coastal developments – onshore transmission sites, Dundee and Edinburgh Waterfront and the Forth Replacement Crossing – are not considered to present a collision risk.

4.9 Coastal developments at Dundee and Edinburgh waterfront and the Forth Replacement Crossing are not considered likely to displace SPA seabirds from key offshore foraging areas, nor to pose a barrier to movements of birds travelling to offshore foraging areas. Given that all coastal developments are 38 km or further from Inch Cape proposed Offshore Wind Farm (Table 11), any disturbance during operation and construction is unlikely to cause in combination impacts with any construction or operational disturbance at Inch Cape. Therefore these developments are scoped out of the breeding season in-combination assessment.

4.10 Coastal onshore transmission sites for offshore wind farms are similarly unlikely to cause in combination effects in terms of displacement, disturbance or present a barrier to seabirds. The laying of transmission cables from an offshore wind farm to the coast might cause some construction disturbance to seabirds, which could potentially act in combination with construction of the Inch Cape Offshore Wind Farm, depending on the relative construction timetables. Thus on a precautionary basis, the onshore transmission sites for Inch Cape, Neart na Gaoithe and Firth of Forth Round 3 are scoped in for potential in-combination construction disturbance only.

4.11 Excluding Dundee and Edinburgh Waterfront Developments, and the Forth Replacement Crossing, all other developments are considered in Table 12. For each qualifying species a list of developments falling within the foraging range of SPAs is provided. This identifies the developments to be considered for potential in combination effects. At this stage it is not possible to rule out any other developments for in combination effects, given that all the offshore wind farms and onshore transmission works identified in Table 11 fall within the foraging ranges of the two most wide-ranging SPA species, gannet and fulmar. For species with shorter foraging ranges, some developments may be ruled out for in combination assessments for some SPAs because they are beyond the likely foraging range (Table 12). Distances between individual developments and SPAs are given in Appendix 6.

TABLE 12: DEVELOPMENTS SCOPED IN FOR IN COMBINATION ASSESSMENT FOR SEABIRD SPECIES AND SPAS BASED ON SPA DISTANCES

Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)	SPA(s)	Foraging range (km)	Potential in-combination impacts	Developments within foraging range of SPA(s) to consider for in-combination assessment (OWF = Offshore Wind Farm; OT = Onshore Transmission)
Fulmar*	• Forth Islands • Fowlsheugh • Buchan Ness to Collieston	400	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Blyth OWF • Moray Firth R3 OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF Final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Beatrice Demonstrator OWF • Beatrice OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Gannet	Forth Islands	354	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Blyth OWF • Moray Firth R3 OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Beatrice Demonstrator OWF • Beatrice OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Lesser black-backed gull	Forth Islands	141	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Blyth OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT

TABLE 12: DEVELOPMENTS SCOPED IN FOR IN COMBINATION ASSESSMENT FOR SEABIRD SPECIES AND SPAS BASED ON SPA DISTANCES				
Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)	**SPA(s)**	**Foraging range (km)**	**Potential in-combination impacts**	**Developments within foraging range of SPA(s) to consider for in-combination assessment (OWF = Offshore Wind Farm; OT = Onshore Transmission)**
Puffin	Forth Islands	151	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Blyth OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Guillemot*	• Forth Islands • Fowlsheugh • St Abbs Head to Fast Castle • Buchan Ness to Collieston	134	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Blyth OWF • Moray Firth R3 OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Beatrice Demonstrator OWF • Beatrice OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Razorbill*	• Forth Islands • Fowlsheugh • St Abbs Head to Fast Castle	84	• Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Kittiwake*	• Forth Islands • Fowlsheugh • St Abbs Head to Fast Castle • Buchan Ness to Collieston	83	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Moray Firth R3 OWF • Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Herring gull*	• Forth Islands • Fowlsheugh • St Abbs Head to Fast Castle	61	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Aberdeen OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT

TABLE 12: DEVELOPMENTS SCOPED IN FOR IN COMBINATION ASSESSMENT FOR SEABIRD SPECIES AND SPAS BASED ON SPA DISTANCES				
Qualifying species with potential connectivity (* identifies species which are cited as components of a seabird breeding assemblage rather than as qualifying species in their own right)	**SPA(s)**	**Foraging range (km)**	**Potential in-combination impacts**	**Developments within foraging range of SPA(s) to consider for in-combination assessment (OWF = Offshore Wind Farm; OT = Onshore Transmission)**
Sandwich tern	Forth Islands	49	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Firth of Forth R3 OWF Phase 1 • Firth of Forth R3 OWF Phase 2/3 • Firth of Forth R3 OWF final Phase • Neart na Gaoithe OWF • Methil Demonstrator OWF • Inch Cape OT • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Arctic tern	Forth Islands	31	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Methil Demonstrator OWF • Firth of Forth R3 OWF Phase 2/3 • Inch Cape OT • Neart na Gaoithe OWF • Neart na Gaoithe OT • Forth of Forth R3 Phase I OT • Firth of Forth R3 Phase 2/3 OT
Common tern	Forth Islands	26	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	• Methil Demonstrator OWF • Firth of Forth R3 OWF Phase 2/3 • Inch Cape OT • Neart na Gaoithe OWF • Neart na Gaoithe OT • Firth of Forth R3 Phase 2/3 OT
Breeding Seabird Assemblage	• Forth Islands • Fowlsheugh • St Abbs Head to Fast Castle • Buchan Ness to Collieston	n/a	• Collision mortality • Disturbance • Displacement • Barrier effect • Indirect impacts on food supply	All species identified as notable components of seabird assemblages have been considered individually based on their foraging range. See above.

Non-Breeding Season

4.12 At the time of writing, SNH and JNCC are considering possible approaches to HRA in relation to offshore wind farms for seabird species during post-breeding, passage and over-wintering periods, and for non-seabird passage species (Marine Scotland 2012). **Thus the advice given in this report about further work requirements is preliminary pending further dialogue with statutory nature conservation bodies and Marine Scotland.**

<u>Seabirds</u>

4.13 For seabirds outside the breeding season, LSE has been indentified on a precautionary basis for the following species, in each case on the basis of potential collision risk (Table 8):

- Gannet
- Kittiwake
- Herring gull
- Great black-backed gull
- Great skua
- Arctic skua
- Arctic tern
- Common tern
- Storm petrel

- Lesser black-backed gull
- Little tern
- Sandwich tern
- Roseate tern

4.14 During the breeding season, SPAs from which seabirds recorded in the Inch Cape survey area are most likely to originate have been identified based on available information on the foraging ranges of each species. Outside the breeding season, birds range more widely from colonies and SPA connectivity becomes much more difficult to predict (unless there are records of the movements of individual birds fitted with remote monitoring devices such as satellite tags). Further work to clarify LSE for the seabird species listed above will involve assessing the magnitude of the collision risk, using records of birds in flight from boat surveys in a collision risk model for offshore wind farms (Band 2011), or calculating potential migratory passage rates and collision risk based on methods set out in Wright et al. (2012). Should collision risk models suggest that the mortality for any species outside the breeding season may have population level effects, then further assessment will be done to consider SPA populations which may be affected and also the scale of potential in-combination assessments, for example where seabirds may encounter a number of wind farms during migratory movements.

Non-Seabirds

4.15 Bird species other than seabirds which may pass through the proposed Inch Cape Offshore Wind Farm on migration are listed in Table 9. A total of 48 species has been identified which may be subject to collision risk during migration. Based on the recommendations in Wright et al. 2012, further work on these species would involve calculating migratory passage rates and collision risk as set out in this report. Preliminary work done by SNH on Svalbard barnacle goose has indicated that collision risk for this species in relation to proposed offshore wind farms in the outer Forth and Tay is negligible (spreadsheet sent by email from Catriona Gall, SNH Renewable energy Casework Advisor, 29 March 2011). Similarly a preliminary analysis of potential collision risk for migratory bar-tailed godwit in relation to the Forth and Tay offshore wind farm proposals concluded that the risk of a significant level of collision mortality for this species within the region was low (NIRAS 2011; note that advice from SNH suggests that this assessment may need to be re-done using the SOSS recommended methodology).

4.16 Should further assessment suggest that the potential mortality for any migratory species outside the breeding season may have population level effects, then further work will be done to consider SPA populations which may be affected and also the scale of potential in-combination assessments, for example where migratory species may encounter a number of wind farms during migratory movements.

Next Steps

4.17 This report is submitted to Marine Scotland and its statutory nature conservation advisors, SNH and JNCC, to seek, for the proposed Inch Cape Offshore Wind Farm:

- agreement on the qualifying species and SPAs for which AA is required during the breeding season;
- agreement on the developments to be included within the in combination assessment for the breeding season; and
- further advice in relation to defining SPA connectivity, LSE and AA and in combination effects outside the breeding season for seabirds and non-seabirds on migration. This will include whether recommendations from SOSS on calculation of migratory passage rates and collision risk (as set out in Wright et al. 2012) should be followed.

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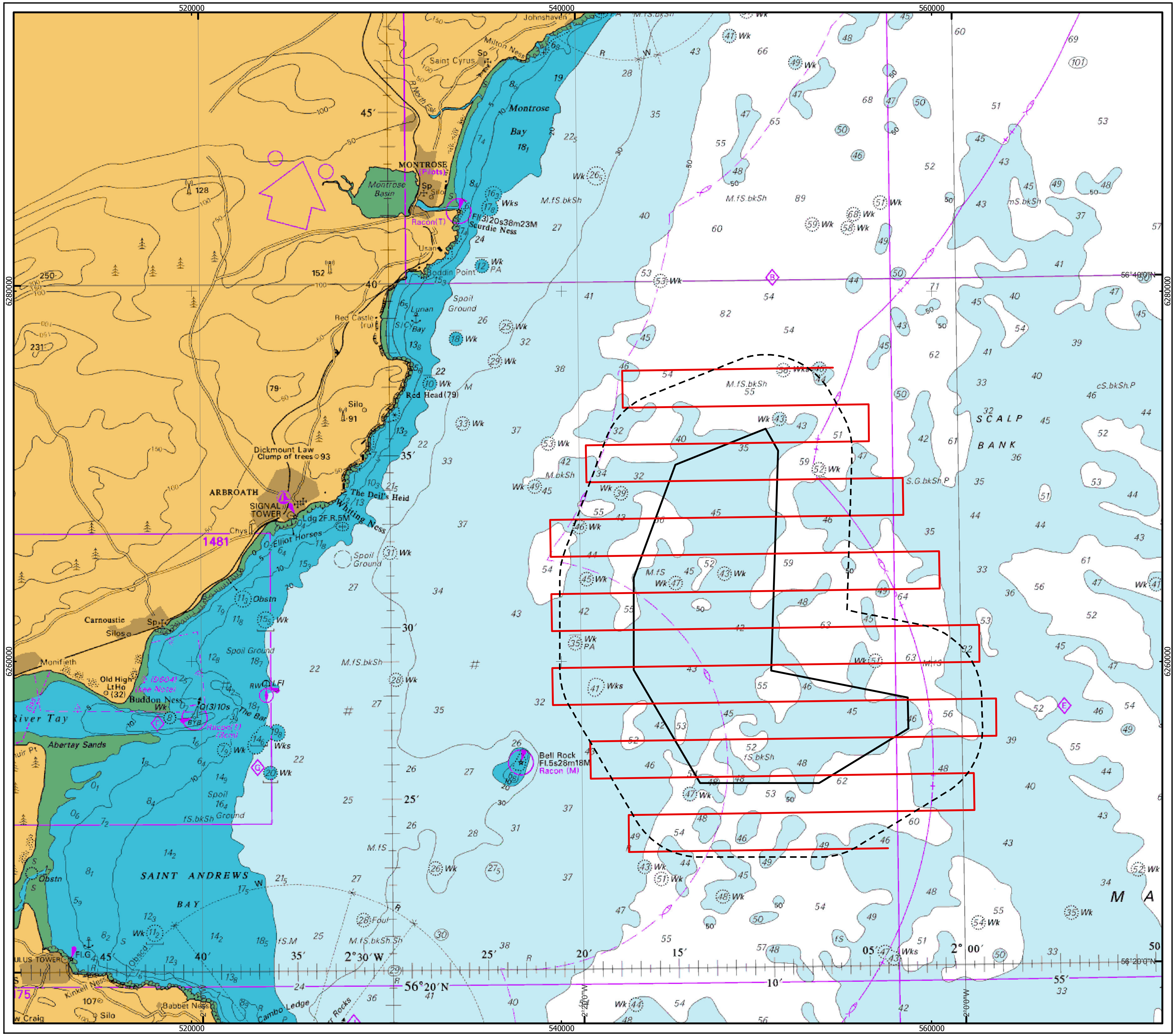
FIGURES

List of Figures:



REPSOL
edp renewables

Inch Cape Offshore Limited

KEY

- Site boundary
- 4km buffer from site boundary
- Boat transect route

Horizontal Scale1:200,000 A3 Chart

0 3 6 Kilometres N

Geodetic Parameters: WGS84 UTM Zone 30N

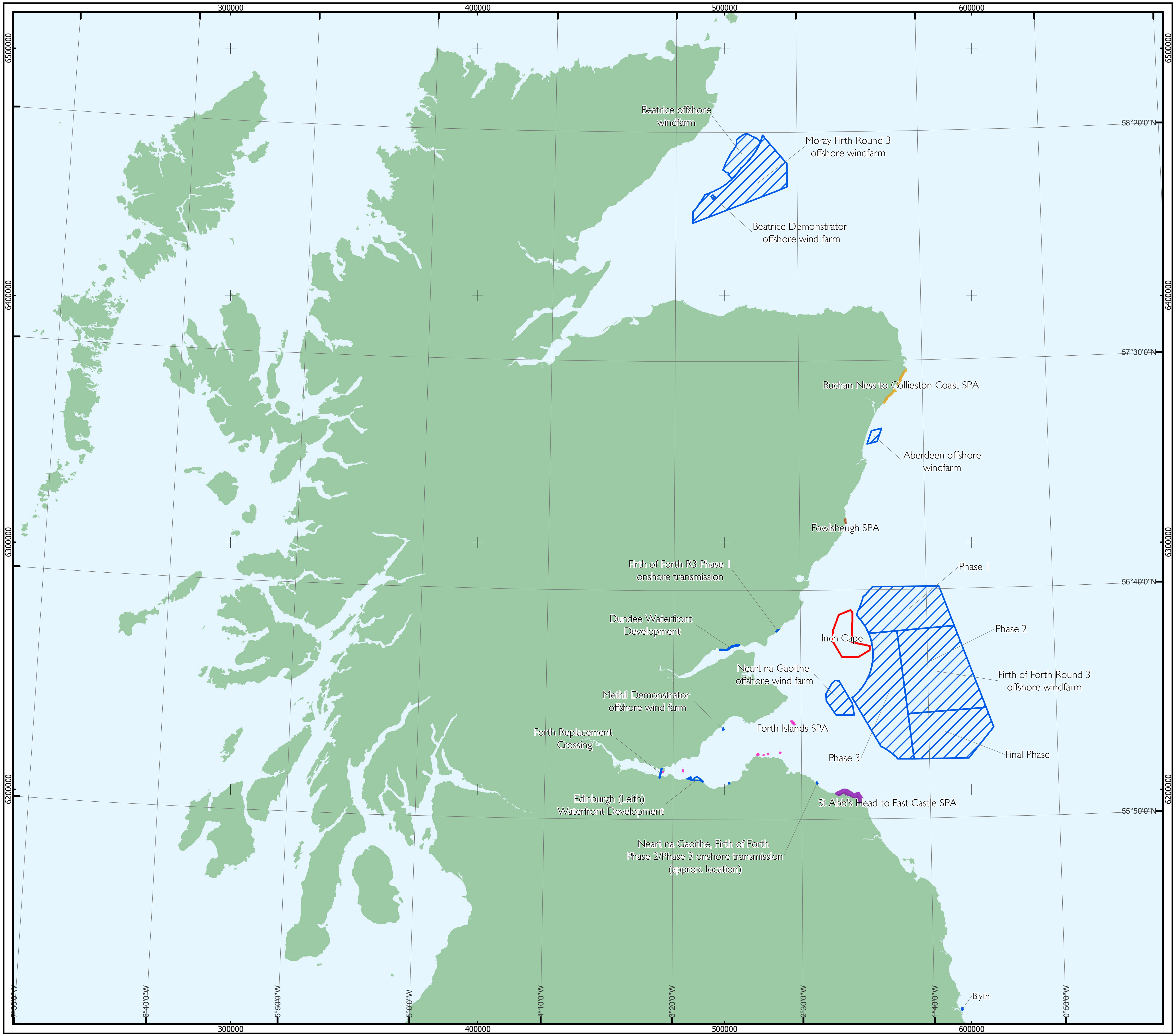
Produced: MD
Reviewed: HR
Approved: CH

Date: 24/08/2012	Revision: a

REF: SGP6489_SL_001a

Figure 1
Boat-based Survey Area

Inch Cape Offshore
Wind Farm



REPSOL

edp renewables

Inch Cape Offshore Limited

KEY

Site boundary

Nearby developments

SPAs

Buchan Ness to Collieston Coast

Forth Islands

Fowlsheugh

St Abb's Head to Fast Castle

Horizontal Scale1:1,500,000 A3 Chart

0 25 50 Kilometres

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: MD
Reviewed: HR
Approved: CH

Date: 24/08/2012 Revision: a

REF: SGP6490_OR_021a

Figure 2
Nearby Developments and SPAs

Inch Cape Offshore Wind Farm

APPENDIX 1 – SUMMARY OF BOAT SURVEY METHODOLOGY

KEY COMPONENTS OF SURVEY METHODOLOGY	
Study design	
Survey effort	Monthly, over 2 years
Study area	Site boundary plus 4 km buffer (430 km^2)
Transect interval	2 km separation
Transect orientation	East-west; parallel transects
Transect tails	Not surveyed
Total transect length	219 km
Weather constraints	No surveys in sea state 5 or more; visibility less than 300 m
Navigation	
Recording of location	60 second intervals (automated through 2 different systems)
Sampling	
Detection	Predominantly through naked eye, binoculars used for identification, although the latter are used more regularly for bird feeding concentrations and in rougher sea states
Scan arc (birds)	90 degrees; single side of the vessel during all surveys
Number of surveyors	1 primary observer, 1 scribe, 1 extra surveyor allowing for rotation of roles
Strip width	300 m (distance bands A-E; 0-50 m, 50-100 m, 100-200 m, 200-300 m, 300 m+)
Basic recording interval	1 minute
Snapshot interval	1 minute
Snapshot box	Parallel to vessel, 300x300m
Height classes	Bands: on the sea surface, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 35 m, 40 m, 50 m, …100 m, 150 m, 150 m+)
Data	
Primary bird data collected	Species, number, distance, flight height, behaviour, flight direction
Secondary bird data collected	Age, sex, moult status, plumage, associations
Other data collected	Weather conditions, visibility, glare, activity of other vessels

APPENDIX 2 – RAW SURVEY DATA

RAW SURVEY DATA FOR 2010-2011 INCH CAPE MONITORING PROGRAMME

Species	2010			2011											
	Sep	Oct	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Red-throated diver				3										3	
Great northern diver														2	
Fulmar	20	5	56	55	33	44	24	21	40	16	71	23	154		29
Storm petrel													7		
Manx shearwater	9	10		1				74	7	23	4	11	5		
Sooty shearwater	60	96									7	24	12		
Gannet	583	433	8	51	425	344	916	1,089	1,197	1,597	1,307	749	325	154	24
Shag					13	6		1							1
Pink-footed goose	30														
Barnacle goose		338													
Shelduck						1									
Long-tailed duck			2												
Eider							3							2	
Duck species												1			
Common gull		14	37	8	9	5		3		1	4		1	2	1
Kittiwake	316	1,688	22	402	52	140	116	453	624	1,697	396	1,868	594	858	219
Little gull	15	6		6	5		3			20	11				
Herring gull		11	60	93	22	16	10	2	43				7	7	13
Great black-backed gull	17	38	47	26	10	6	4	1		1		25	16	23	50
Lesser black-backed gull							4	16	24	1	3				
Large gull species	2	103	4	1		1	2		2						2
Gull species			1	2									1		1
Great skua	3								1	2	1	3	18	8	3
Pomarine skua		3						1					11	10	1
Arctic skua	2	5								5		6	2	4	
Skua species													2		
Arctic tern	5							1		27	264				
Common tern	18	1								3					
Arctic/common tern	3										8				
Guillemot	156	616	184	342	120	679	68	428	2,010	1,243	382	1,190	110	354	196
Razorbill	176	1,299	77	83	57	200	41	55	50	762	84	1,482	619	102	74
Puffin	78	49	5		3	49	201	675	378	323	616	369	430	71	44
Little auk			22	7	3									341	357
Guillemot/razorbill	86	329	22	118	43	94	3	16	1	434	25	994	96	55	74
Auk species	3	3	22	1	1	10		10	100	5	6	229	25	34	13
Oystercatcher											20				
Golden plover														2	
Ringed plover													1		
Purple sandpiper														1	
Curlew									3						
Grey phalarope		2										3	1	21	
Wader species		1													
Woodpigeon													1		
Feral pigeon									1						
Meadow pipit		10					6					97			
Pied wagtail		1													
House martin								2							
Swift										1	1				
Swallow											1	10			
Song thrush												1	7		
Blackbird													1		
Fieldfare													82		
Redwing													20		
Blackcap														1	
Starling													1	5	
Carrion crow							1								
Passerine species					1							3	1		

Notes:
Data represents raw counts, and includes off-effort sightings (observations made on the non-survey side of the vessel or notable observations on transect tails. In addition data represents coverage of an extended study area, which is slightly larger than the footprint and associated 4 km buffer zone (see RPS 2012a and 2012b)

APPENDIX 3 – KEY SPECIES DENSITY ESTIMATES

Density Estimates for Inch Cape Survey Area

Calculation of density estimates is described in RPS 2012a and b. For the most numerous species, separate density estimates are presented for birds in the water and in flight. For species with relatively few observations, overall density estimates are given. Confidence intervals are not presented here but will be included in the final HRA and Technical Report for Inch Cape Offshore Wind Farm.

GANNET: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	0.337	1.576
Oct 2010	0.811	0.968
Dec 2010	0.030	0.065
Jan 2011	0	0.066
Feb 2011	0	0.561
Mar 2011	0.060	0.653
Apr 2011	1.141	4.476
May 2011	1.351	3.609
Jun 2011	1.471	3.276
Jul 2011	1.051	5.367
Aug 2011	1.441	4.34
Sept 2011	1.161	2.730
Oct 2011	0.580	1.123
Nov 2011	0.193	0.313
Dec 2011	0.027	0.116
Notes: Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.		

KITTIWAKE: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	0.987	0.275
Oct 2010	6.864	1.130
Dec 2010	0.352	0.051
Jan 2011	1.760	0.396
Feb 2011	0.704	0.043
Mar 2011	0.528	0.374
Apr 2011	3.872	0.830
May 2011	4.048	1.633
Jun 2011	6.864	4.336
Jul 2011	7.392	8.905
Aug 2011	1.760	0.586
Sept 2011	1.408	0.497
Oct 2011	0.704	0.135
Nov 2011	1.232	0.220
Dec 2011	1.232	0.087
Notes: Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.		

GUILLEMOT: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	3.536	0.051
Oct 2010	7.742	0.341
Dec 2010	4.373	0.248
Jan 2011	6.323	0.540
Feb 2011	3.723	0.132
Mar 2011	10.224	0.921
Apr 2011	2.837	0.182
May 2011	8.569	0.137
Jun 2011	36.344	0.681
Jul 2011	18.556	0.685
Aug 2011	4.078	0
Sept 2011	20.507	0.049
Oct 2011	1.714	0.099
Nov 2011	6.619	0.347
Dec 2011	4.846	0.499
Notes: Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.		

RAZORBILL: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	2.512	0.245
Oct 2010	9.332	0.325
Dec 2010	1.909	0.031
Jan 2011	1.343	0.199
Feb 2011	0.566	0.097
Mar 2011	3.323	0.286
Apr 2011	1.555	0.034
May 2011	0.990	0.067
Jun 2011	1.838	0.033
Jul 2011	18.806	0.165
Aug 2011	1.980	0.016
Sept 2011	24.109	0.831
Oct 2011	2.757	1.172
Nov 2011	1.626	0.243
Dec 2011	1.414	0.114
Notes: Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.		

PUFFIN: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	2.242	0
Oct 2010	0.834	0.132
Dec 2010	0.209	0
Jan 2011	0	0
Feb 2011	0	0
Mar 2011	1.251	0.043
Apr 2011	4.066	0.924
May 2011	11.103	1.241
Jun 2011	8.496	0.293
Jul 2011	9.435	0.193
Aug 2011	6.568	0.545
Sept 2011	9.122	0.065
Oct 2011	11.937	0.033
Nov 2011	3.023	0
Dec 2011	1.668	0
Notes: Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.		

LITTLE AUK: DENSITY ESTIMATES FOR INCH CAPE SURVEY AREA		
Survey	**Study area**	
	Birds on the water (birds/km^2)	**Birds in flight (birds/km^2)**
Sep 2010	0	0
Oct 2010	0	0
Dec 2010	0.814	0.016
Jan 2011	0.452	0
Feb 2011	0.090	0
Mar 2011	0	0
Apr 2011	0	0
May 2011	0	0
Jun 2011	0	0
Jul 2011	0	0
Aug 2011	0	0
Sept 2011	0	0
Oct 2011	0	0
Nov 2011	14.026	0.132
Dec 2011	14.116	0.200

Notes:
Density estimates as presented here might still change as more data becomes available; no confidence intervals have been calculated at this stage.

OTHER SPECIES – INCH CAPE SURVEY AREA DENSITY ESTIMATES SEP 2010 – DEC 2011												
Survey	**Overall density (birds/km^2)**											
	Fulmar	**Manx shearwater**	**Sooty shearwater**	**Little gull**	**Herring gull**	**Lesser black-backed gull**	**Great black-backed gull**	**Arctic tern**	**Common tern**	**Arctic skua**	**Great skua**	**Shag***
Sep 2010	0	0.035	0.035	0.105	0	0	0.035	0	0.209	0	0	0
Oct 2010	0	0.139	0.775	0	0.134	0	0.438	0	0	0.009	0	0
Dec 2010	0.472	0	0	0	0.203	0	0.273	0	0	0	0	0
Jan 2011	0.232	0	0	0.083	0.837	0	0.118	0	0	0	0	0
Feb 2011	0.114	0	0	0	0.086	0	0.070	0	0	0	0	7
Mar 2011	0.131	0	0	0	0.117	0	0.032	0	0	0	0	6
Apr 2011	0.068	0	0	0	0.203	0.034	0.034	0	0	0	0	0
May 2011	0.118	0.405	0	0	0.017	0.072	0	0	0	0	0	0
Jun 2011	0.163	0.065	0	0	0.302	0.103	0	0	0	0	0.016	1
Jul 2011	0.083	0.220	0	0.378	0	0	0	0.499	0.049	0.029	0.016	0
Aug 2011	0.226	0.080	0.095	0.064	0	0	0	1.291	0	0	0	0
Sep 2011	0.166	0.096	0.072	0	0	0	0.058	0	0	0.009	0	0
Oct 2011	0.431	0.021	0.016	0	0.082	0	0.066	0	0	0.02	0.085	0
Nov 2011	0	0	0	0	0.048	0	0.115	0	0	0	0.036	0
Dec 2011	0.149	0	0	0	0.113	0	0.294	0	0	0	0	1

Notes:
Density estimates are based on relatively few observations and are for indicative purposes only; no confidence intervals have been calculated at this stage.
* For shag raw counts are provided as no observations were ”within transect”, and thus not allowing for density estimation

APPENDIX 4 – FLIGHT HEIGHT DATA

INCH CAPE SURVEY AREA: Flight height distribution for all species derived from boat survey data for September 2010 to December 2011 (wind farm and buffer only)

Species	Number of birds on sea surface	Flight height bands (m)												Total number of birds recorded	Number of birds in flight	Number of birds at PCH[1]	% at PCH[1]
		5	10	15	20	25	30	35	40	50	60	75	100				
Arctic skua	2	12	2		1		2							19	17	2	11.76
Arctic tern	60	199	17											276	216	0	0
Auk species	373	56	1	1										431	58	0	0
Barnacle goose		14	18							2			37	71	71	39	54.92
Carrion crow									2					2	2	2	100
Common gull	6	13	14	2	11	8	13		1	2		1		71	65	17	26.15
Common tern		9			3									12	12	0	0
Common/Arctic tern	5	3												8	3	0	0
Curlew		2					1							3	3	1	33.33
Eider		8												8	8	0	0
Fulmar	56	370	6											432	376	0	0
Fieldfare		76				5								81	81	0	0
Feral pigeon			1											1	1	0	0
Guillemot/Razorbill	1,585	442	4											2,031	446	0	0
Great black-backed gull	34	45	29	9	26	10	26		16	5		1		201	167	48	28.74
Golden plover		2												2	2	0	0
Guillemot	5,374	1,234	2											6,610	1,236	0	0
Gull species		1			1					2				4	4	2	50
Gannet	692	5,869	541	272	460	69	225	5	114	20				8,267	7,575	364	4.80
Herring gull	21	89	33	11	47	10	32		9	5				257	236	46	19.49
House martin			1											1	1	0	0
Kittiwake	3,298	2,594	949	345	719	137	101	1	24	14				8,182	4,884	140	2.86
Lesser black-backed gull	2	16	7	4	6	1	4		3					43	41	7	17.07
Large gull species	99	3			4	1	3		1	2	1			114	15	7	46.66
Little auk	578	80												658	80	0	0
Long-tailed duck		2												2	2	0	0
Little gull	13	22	8	4		1								48	35	0	0
Meadow pipit		9	95		13									117	117	0	0
Manx shearwater	39	80												119	80	0	0
Great northern diver						1								1	1	0	0
Great skua	2	17	4	2	4	1			1					31	29	1	3.44
Oystercatcher		20												20	20	0	0
Sooty shearwater	38	53	1											92	54	0	0
Passerine species			5											5	5	0	0
Pomarine skua	1	18	2				1		1					23	22	2	9.09
Grey phalarope	15	3												18	3	0	0
Purple sandpiper		1												1	1	0	0

INCH CAPE SURVEY AREA: Flight height distribution for all species derived from boat survey data for September 2010 to December 2011 (wind farm and buffer only)																	
Species	**Number of birds on sea surface**	**Flight height bands (m)**												**Total number of birds recorded**	**Number of birds in flight**	**Number of birds at PCH[1]**	**% at PCH[1]**
		5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**50**	**60**	**75**	**100**				
Puffin	2,105	833												2,938	833	0	0
Pied wagtail		1												1	1	0	0
Razorbill	2,816	1,117	5	2										3,940	1,124	0	0
Redwing			4			1								5	5	0	0
Red-throated diver							1		2					3	3	3	100
Ringed plover		1												1	1	0	0
Shag	1	18												19	18	0	0
Starling		6												6	6	0	0
Swift			1	1										2	2	0	0
Skua species		2												2	2	0	0
Swallow		10		1										11	11	0	0
Song thrush		8												8	8	0	0
Shelduck		1												1	1	0	0
Storm petrel	2	4												6	4	0	0
Woodpigeon		1												1	1	0	0
Total	17,217	13,364	1,750	654	1,295	245	409	6	174	52	1	2	37	35,206	17,989	681	3.78

Notes:

observations relate to those recorded within the wind farm footprint and 4 km buffer only, data from the extended study area out with these polygons is not included

1 PCH = Potential Collision Height, here assumed to lie at 30 m and above

APPENDIX 5 – SPA DISTANCES FROM INCH CAPE

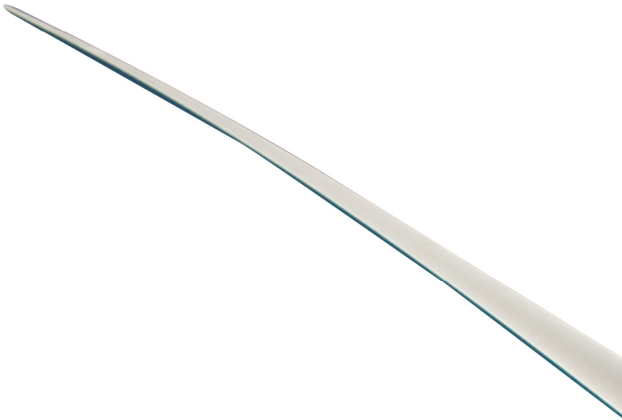
DISTANCE BETWEEN INCH CAPE SURVEY AREA AND SPECIAL PROTECTION AREAS FOR BREEDING SEABIRDS		
SPA	**Qualifying species[1]**	**Distance to Inch Cape[2] (km)**
Auskerry	Storm petrel, Arctic tern	293
Buchan Ness to Collieston Coast	Herring gull, fulmar, guillemot, kittiwake, shag, seabird assemblage	82
Calf of Eday	Cormorant, fulmar, great black-backed gull, guillemot, kittiwake, seabird assemblage	319
Cape Wrath	Fulmar, guillemot, puffin, razorbill, kittiwake, seabird assemblage	371
Copinsay	Fulmar, great black-backed gull, guillemot, kittiwake, seabird assemblage	281
East Caithness Cliffs	Cormorant, great black-backed gull, guillemot, herring gull, kittiwake, puffin, razorbill, shag, fulmar, seabird assemblage, peregrine falcon	231
Fair Isle	Shag, Arctic skua, fulmar, gannet, great skua, kittiwake, puffin, razorbill, guillemot, Arctic tern, seabird assemblage, Fair Isle wren	329
Firth of Tay & Eden Estuary	Little tern, marsh harrier, bar-tailed godwit, common scoter, cormorant, eider, goldeneye, goosander, grey plover, black-tailed godwit, long-tailed duck, oystercatcher, pink-footed goose, red-breasted merganser, sanderling, shelduck, velvet scoter, dunlin, greylag goose, redshank, waterfowl assemblage	22
Flamborough Head & Bempton Cliffs	Kittiwake, puffin, razorbill, guillemot, herring gull, gannet, seabird assemblage	301
Forth Islands: Bass Rock Craigleith Fidra Inchmickery Isle of May The Lamb Long Craig	Common tern, cormorant, fulmar, gannet, herring gull, kittiwake, lesser black-backed gull, puffin, roseate tern, Sandwich tern, shag, Arctic tern, guillemot, razorbill, seabird assemblage	 45 47 49 75 79 30 48 87
Foula	Arctic tern, fulmar, great skua, guillemot, Leach's petrel, puffin, razorbill, red-throated diver, Arctic skua, kittiwake, shag, seabird assemblage	401
Fowlsheugh	Fulmar, guillemot, herring gull, kittiwake, razorbill, seabird assemblage	31
Hoy	Arctic skua, great skua, great black-backed gull, guillemot, kittiwake, red-throated diver, fulmar, puffin, seabird assemblage, peregrine falcon	283
Imperial Dock Lock, Leith	Common tern	83
Mousa	Arctic tern, storm petrel	394
North Caithness Cliffs	Fulmar, guillemot, kittiwake, puffin, razorbill, seabird assemblage, peregrine falcon.	257
North Rona & Sula Sgeir	Gannet, great black-backed gull, guillemot, kittiwake, puffin, razorbill, storm petrel, fulmar, Leach's petrel, seabird assemblage	444
Noss	Fulmar, great skua, guillemot, kittiwake, puffin, gannet, seabird assemblage	414
Priest Island	Storm petrel	465
Rousay	Guillemot, Arctic skua, Arctic tern, fulmar, kittiwake, seabird assemblage	322
St Abbs to Fast Castle	Herring gull, guillemot, kittiwake, razorbill, shag, seabird assemblage	50
St Kilda	Fulmar, Manx shearwater, gannet, great skua, guillemot, kittiwake, Leach's petrel, puffin, razorbill, storm petrel, seabird assemblage	618
Sule Skerry & Sule Stack	Gannet, storm petrel, guillemot, Leach's petrel, puffin, shag, seabird assemblage.	361
Sumburgh Head	Kittiwake, Arctic tern, Fulmar, Guillemot, seabird assemblage	377
Treshnish Isles	Storm petrel, Greenland barnacle goose	660
Troup, Pennan & Lions Heads	Razorbill, fulmar, guillemot, herring gull, kittiwake, seabird assemblage	143
West Westray	Kittiwake, Arctic skua, Arctic tern, fulmar, guillemot, razorbill, seabird assemblage	331

Notes:
1. For Scottish SPAs, based on SNH sitelink http://gateway.snh.gov.uk/sitelink/index.jsp; for others taken from JNCC SPA site accounts http://jncc.defra.gov.uk/page-1417
2. Distances are the shortest direct route between the Inch Cape survey area (site boundary and 4km buffer) and the SPA boundary (excluding any marine extension to an SPA). If this would involve an overland crossing then the shortest distance by sea has been calculated.

APPENDIX 6 – SPA DISTANCES FROM DEVELOPMENTS CONSIDERED FOR IN COMBINATION ASSESSMENT

DISTANCES (MINIMUM DISTANCE BY SEA, KM)* BETWEEN DEVELOPMENTS CONSIDERED FOR IN COMBINATION ASSESSMENT AND SPAS										
Project (OWF = Offshore Wind Farm, OT = Onshore Transmission)	**Forth Islands Bass Rock**	**Forth Islands Craigleith**	**Forth Islands Fidra**	**Forth Islands Inch-mickery**	**Forth Islands Isle of May**	**Forth Islands Lamb**	**Forth Islands Long Craig**	**Buchan Ness to Collieston**	**Fowlsheugh**	**St Abbs Head to Fast Castle**
Aberdeen OWF	130	132	133	152	116	133	156	10	32	141
Beatrice OWF	233	233	233	240	221	233	242	104	145	252
Beatrice Demonstrator OWF	226	225	225	232	213	226	233	104	140	246
Blyth OWF	127	129	132	148	133	130	154	247	202	94
Firth of Forth R3 OWF Phase 1	60	63	66	94	47	65	100	75	28	65
Forth of Forth R3 Phase I OT	49	49	50	68	37	50	73	101	51	70
Firth of Forth R3 OWF Phase 2	54	59	63	94	46	61	102	93	28	39
Firth of Forth R3 OWF Phase 3	36	41	44	75	26	43	82	93	48	22
Firth of Forth R3 OWF Final Phase	53	126	62	93	46	60	101	81	81	27
Firth of Forth R3 Phase 2/3 OT	19	23	26	54	25	24	62	156	46	10
Inch Cape OT	24	20	16	19	35	18	27	166	115	45
Methil Demonstrator OWF	25	20	17	23	27	19	29	147	97	53
Moray Firth R3 OWF	217	217	216	222	205	217	222	88	134	238
Neart na Gaoithe OWF	27	31	35	65	16	33	72	114	64	31
Neart na Gaoithe OT	19	23	26	54	25	24	62	156	105	10

* The minimum distance by sea is given, avoiding overland crossings



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