

## Chapter 11 Nature Conservation

### 11.1 Introduction

- 1 This chapter provides details on the designated sites (including potential future sites), habitats and species of nature conservation interest with the potential to be affected by the development or operation of the Neart na Gaoithe offshore works.
- 2 This chapter also provides information on Habitats Regulations Appraisal (HRA), a requirement for the project given the potential interaction between the project and Natura 2000 sites. An introduction to HRA is provided in Box 1.1 below. All further text and information pertaining to HRA is contained within green boxes.
- 3 Further detail on specific species of nature conservation interest in the vicinity of the Neart na Gaoithe development site and potential impacts on these is provided in the individual topic chapters: Chapter 12: Ornithology, Chapter 13: Marine Mammals, Chapter 14: Benthic Ecology and Chapter 15: Fish and Shellfish Ecology.

#### Box 1.1 Habitats Regulations Appraisal: Introduction

The Habitats Regulations require that where a project (or plan) could affect a Natura 2000 site (or its qualifying interests) then the competent authority must consider whether the plan or project is likely to give rise to a significant effect, and if so, make an appropriate assessment (AA) of the implications of the project in view of the site's conservation objectives. This process is known as HRA in the UK, or more widely as an Article 6 Assessment (European Commission (EC), 2002). Marine Scotland, as the competent authority for offshore wind farm developments in Scottish Territorial Waters (STW), and the Scottish Government's statutory nature conservation advisers - Scottish Natural Heritage (SNH) - have confirmed that a project level HRA is required (Marine Scotland, 2011a; 2011b; SNH, 2010).

Therefore the potential significant impacts of the proposed Neart na Gaoithe offshore wind farm development upon these sites, qualifying features and nature conservation objectives have been assessed and information is summarised in this chapter as information to inform assessment by the competent authority. Following EC guidance (European Commission, 2002), all information related to HRA is presented in this 'boxed' format.

### 11.2 Guidance and Data Sources

- 4 A range of guidance has been taken into account in describing relevant sites of nature conservation importance in relation to the development and operation of the Neart na Gaoithe offshore wind farm:
  - Guidance on offshore wind farm development and nature conservation (Defra, 2005);
  - EC guidance on plans and projects significantly affecting protected sites (EC, 2002);
  - Scottish Executive guidance on implementation of the Habitats and Birds Directive (Scottish Executive, 1995);
  - Guidance on plans and need for appropriate assessment (AA) (Scottish Executive, 2006);
  - Guidance on wind farm development and nature conservation (English Nature *et al.*, 2001);
  - Handbook on Environmental Impact Assessment in Scotland (Scottish Natural Heritage, 2009);
  - Guidance for marine and coastal ecological impact assessment in Britain and Ireland (IEEM, 2010); and
  - Guidance and advice from Marine Scotland, the Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage (SNH), including responses to the Scoping Report, and specific guidance on HRA.

- 5 Data and information on the nature conservation designations in the vicinity of the proposed Neart na Gaoithe offshore wind farm have been obtained from a variety of sources, as follows:
  - European Commission Europa databases;
  - SNH and JNCC website and site information;
  - The Scottish Wildlife Trust;
  - SeaZone data;
  - Marine Scotland publications and data; and
  - Scottish Government publications.

### 11.3 Engagement and Commitments

#### 11.3.1 Strategic Requirements

- 6 Consultation with interested parties as well as strategic assessment undertaken by the Scottish Government has resulted in a number of requirements and commitments relevant to the Environmental Statement (ES) and associated HRA for Neart na Gaoithe. Table 11.1 below summarises those comments and requirements and how they have been addressed in this ES. Requirements and advice concerning HRA are outlined in Boxes 1.2 and 1.3.

#### Box 1.2 Habitats Regulations Appraisal: Strategic Requirements

##### Blue Seas - Green Energy: A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters. Part B: Post Adoption Statement (Marine Scotland, 2011a)

- Confirms a project level HRA is required for projects considered under the Strategic Environmental Assessment (SEA);
- Recommends referral to the plan-level HRA carried out as part of the SEA; and
- Specifies that project level HRA scopes will need to be agreed with SNH and the regulator.

##### Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment Information Review (Marine Scotland, 2011c)

- Specifies that project level HRA must be completed in the context of the latest scientific knowledge and evidence base;
- Comments that the greatest risk of effects considered under HRA is likely to be to highly mobile species (sea birds, mammals and migratory fish);
- Suggests project level HRAs consider cumulative and in-combination impacts, providing a list of projects to consider as part of the assessment of planned individual offshore wind farm developments; and
- Outlines information to be supplied in project level HRAs, stating that these should include up to date information on relevant Natura 2000 sites, assessment of impacts (including in-combination with other developments) and mitigation measures.

These requirements are taken into account for the project level HRA. Further information is provided throughout this chapter and within individual topic chapters.

Source	Comment	Relevance/reference
<b>Scoping Opinion (SNH advice)</b>	Clarify that the Isle of May is a Special Area of Conservation (SAC) and grey seal are a qualifying interest.	Refer to Section 11.6.2.2: Other Sites and Table 11.4.
	Assessment is needed of impacts on SACs and their qualifying and supporting habitats and species (e.g., sandeels) and subsequent indirect impacts (e.g., marine mammals).	Noted, see HRA information. Impacts on sandeels are assessed in Chapter 15: Fish and Shellfish Ecology.
	Developments should avoid causing direct or indirect damage to seapen species, a UK Biodiversity Action Plan (BAP) species, and identified as threatened/declining by the OSPAR Commission.	There are no noted seapen habitats in the offshore works area, see Chapter 14: Benthic Ecology.
<b>Scoping Opinion (Marine Scotland advice)</b>	Requests that the ES must take account of Coast Protection Act 1949 Section 34, Habitats and Birds Directives, the Wildlife and Countryside Act 1981, Nature Conservation (Scotland) Act 2004, Protection of Badgers Act 1992, Habitats Regulations, Scottish Executive Interim Guidance on European Protected Species (using three fundamental tests), Development Sites and the Planning System, Scottish Biodiversity Strategy and associated Implementation Plans.	Noted, this chapter describes the relevant legislation, though the Marine (Scotland) Act 2010 repeals the Coastal Protection Act Section 34.
	ES should identify Schedule 1 Birds and European Protected Species (EPS), and any species under Schedule 5 and 8 of the Wildlife and Countryside Act 1981, and that the project should obtain relevant licences.	Noted, see Section 11.6.3: Protected Species.
<b>Scoping Opinion (Royal Society for the Protection of Birds (RSPB) comments)</b>	Notes that the proposal could indirectly impact birds (Special Protection Area (SPA) qualifiers) through benthic impacts, this should be addressed.	Noted. See Chapter 15: Fish and Shellfish Ecology for information on impacts on fish prey species.
	Notes that there may be impacts on terrestrial habitats and designated sites.	Noted. Impacts on migratory birds are assessed in Chapter 12: Ornithology. Terrestrial species and habitats will be addressed further in the onshore ES.
	ES should include consideration of Upper Solway Flats and Marshes SPA and Slamannan Plateau SPA.	Noted, see Section 11.6.2: Special Protection Areas.
	ES should consider further SPAs relating to qualifying species in wider development area (e.g., in the North Sea and UK).	
	ES should note future marine SPAs and potential impacts (from the JNCC).	
<b>Scoping Opinion (East Lothian Council)</b>	Firth of Forth to be noted as a Ramsar site.	Noted, see Section 11.6.2.2: Other Sites.
<b>Advice to Forth and Tay Offshore Wind Developer Group (FTOWDG) by SNH</b>	Candidate Natura 2000 sites should be referred to as “potential” (e.g., pSPA).	Noted, see Section 11.6.2.2: Other Sites
	The Birds Directive should be referred to as Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild ornithology.	Noted, see Section 11.5: Legislation.
<b>Comment to Forth and Tay Offshore Wind Developer Group by the RSPB</b>	Assessments should take into account Marine Protected Areas (MPAs) being designated under the Marine (Scotland) Act 2010.	Noted, see Section 11.5: Legislation.

Table 11.1: Strategic and site level commitments and requirements – nature conservation

### 11.3.2 Consultation

7 Consultation and engagement have been undertaken with regulators and statutory consultees throughout the planning of the project. A summary of consultation relating to nature conservation carried out following the scoping stage of Environmental Impact Assessment (EIA) is outlined in Table 11.2 below. Consultation concerning HRA is discussed in Box 1.3.

Consultee	Date	Details
SNH and JNCC	18 April 2011	A meeting was held between SNH/JNCC and Mainstream. SNH advised several items with respect to nature conservation: <ul style="list-style-type: none"> <li>● The ES should refer to SNH scoping response comments and take them on board where possible;</li> <li>● The ES should consider Scotland's Priority Marine Features (PMF); and</li> <li>● The HRA should feed into, and inform, the ES.</li> </ul>
Marine Scotland	19 July 2011	A meeting was held between Marine Scotland, Mainstream and EMU Limited (EMU). Marine Scotland recommended consideration of the following in the ES: <ul style="list-style-type: none"> <li>● The developing Marine Protected Area (MPA) network;</li> <li>● Scotland's PMFs; and</li> <li>● European Protected Species (EPS) should be addressed in a nature conservation chapter.</li> </ul>
Marine Scotland Licensing Operations team (MS-LOT)	September 2011	Email advice received from MS-LOT, suggesting presenting overview of MPA search features and PMFs within national context in ES.
SNH and JNCC	Throughout 2011 and 2012	Several meetings have been held to discuss the scope of and approach to assessment of impacts on birds and marine mammals (including HRA aspects). Further information is presented in Chapter 12: Ornithology, Chapter 13: Marine Mammals, and Appendix 7.1: Consultation and Meeting Log.

Table 11.2: Overview and examples of consultation undertaken for nature conservation topics

### Box 1.3 Habitats Regulations Appraisal: Consultation

Specific consultation has been undertaken in relation to the content and scope of the project HRA.

SNH has advised Marine Scotland on the scope of sites and interest features to be covered by the project HRA as well as the likely significant effects (LSEs) to be assessed in relation to the steps or tests of HRA, as outlined in Box 1.5 (SNH, 2010):

- i. The project is not directly connected with, or necessary for, the conservation management of any Natura 2000 sites;
- ii. The proposed development is likely to have a significant effect on a number of Natura 2000 sites.

Detail has also been provided on the sites and features with which the project is likely to have ecological "connectivity" (SNH, 2010):

- The project is not directly connected with, or necessary for, the conservation management of any Natura 2000 sites;
- The proposed development is likely to have a significant effect on a number of Natura 2000 sites;
- Further detail has been given on qualifying features of Natura 2000 sites (both species and habitats) that are likely to have connectivity and the LSEs that are to be taken into account;
- Through the Firth and Tay Offshore Wind Developers Group (FTOWDG), SNH has advised all developers in the region of the need to address HRA and the sites for consideration (SNH, 2011a);

Dialogue with SNH has continued in relation to specific HRA aspects:

- Birds – meetings have taken place with SNH to advise on results of bird surveys and the scope of HRA. Refer to Chapter 12: Ornithology for more information;
- Marine mammals – meetings have been held with SNH and JNCC (both on a project level and to discuss cumulative impacts through the FTOWDG). Refer to Chapter 13: Marine Mammals for more information; and
- Diadromous/migratory fish – a discussion document on the approach to assessing impacts on diadromous fish species (as qualifying features of SACs) has been produced.

## 11.4 Methodology for Assessment of Impacts on Nature Conservation

8 For sites and species of nature conservation interest, the assessment of impacts has been carried out on a receptor by receptor basis. This includes consideration of cumulative and in-combination impacts (refer to Chapter 6: The Approach to Environmental Impact Assessment). For the approach to assessment of impacts under HRA, refer to Box 1.4 below.

### Box 1.4 Habitats Regulations Appraisal: Methodology

The approach to HRA is based on advice from SNH (SNH, 2010):

- Assessment of impacts for specific receptors is provided on a receptor by receptor basis (refer to Chapter 12: Ornithology, Chapter 13: Marine Mammals, Chapter 14: Benthic Ecology and Chapter 15: Fish and Shellfish Ecology);
- A summary of likely impacts is provided for each relevant Natura 2000 site in this chapter, along with information on site condition and conservation objectives, to inform an appropriate assessment of whether the proposal is likely to have an adverse effect on each site's overall integrity;
- Cumulative impacts on Natura 2000 qualifying species are assessed on a receptor by receptor basis; and
- The other projects assessed as having potential to impact in combination with the Neart na Gaoithe project are those advised by SNH (2010) and in the Blue Seas - Green Energy HRA AA Information Review (Marine Scotland, 2011c).

**NOTE:** For the purposes of HRA, the phrase '*in combination with other plans or projects*' refers to cumulative effects caused by the projects or plans that are currently under consideration, together with the impacts of any existing or proposed projects or plans (EC, 2002).

## 11.5 Legislation

### 11.5.1 International Legislation

9 There are a number of key international agreements and measures to promote conservation of marine habitats and species that Scotland, the UK and the European Union (EU) are parties to. They include:

- The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention);
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention);
- Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo (EIA) Convention);
- The Convention on Biological Diversity (CBD); and
- The Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention).

10 These conventions include commitments on protection of certain rare habitats and species that are found in the marine environment, and are implemented through regional and national policy and legislative frameworks. Appendix 11.1: Nature Conservation Agreements and Conventions provides an overview of relevant international conventions.

11 Within the EU the key international legislative measures requiring the protection of rare and at-risk habitats and species are the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council on the

conservation of wild birds) and the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as amended). These Directives are intended to fulfil the EU's commitment to the CBD and other international conventions and provide a framework for the designation of a network of protected sites for species and features across all EU member states, known as the 'Natura 2000 network'.

12 Species of nature conservation interest not benefitting from protection within the Natura 2000 network but listed within Annex IV of the Habitats Directive receive a different level of protection; these are known as European Protected Species (EPS).

13 An additional European measure applicable to the marine environment is the Marine Strategy Framework Directive (Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy). This provides a legislative framework for marine biodiversity and sets out a target of achieving or maintaining 'good environmental status' of the EU's marine waters. The targets are outlined by several indicators, many linking to habitats and ecological status to be reached by 2020.

### 11.5.2 UK Legislation

14 Within STW the transposing legislation for the Habitats and Birds Directives are the Wildlife and Countryside Act 1981 (as amended), the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations) and the Nature Conservation (Scotland) Act 2004.

15 The Habitats Regulations allow for the designation of Natura 2000 areas: SACs which act to protect ecologically vulnerable or valuable habitats and SPAs for sites which are considered important for bird populations. Under these regulations, the JNCC is responsible for the designation of marine SACs and SPAs beyond 12 nautical miles (NM) and SNH is responsible for marine sites within 12 NM as well as terrestrial sites.

16 In addition to the Natura 2000 network, the Habitats Regulations also implement further protection for EPS whose natural range includes the UK by making it an offence to kill, injure, harm or disturb species listed in Schedule 2 or Schedule 4 of the Regulations. The Habitats Regulations also make provision for certain activities that might otherwise constitute an offence to be carried out by way of a licensing system. Protected species licences are issued by SNH or Marine Scotland for specified activities (listed in the Habitats Regulations) under strict legal conditions and tests.

### Box 1.5 Habitats Regulations Appraisal: Legislation

The Habitats Regulations implement the Habitats Directive in Scottish Territorial Waters (STW). The Regulations require the competent authority to carry out a Habitats Regulations Appraisal if a project is likely to have a significant effect on a Natura 2000 site. If this is so, then it is required to assess the likelihood of a significant adverse effect on the site's ecological integrity occurring, by carrying out an AA. If the AA finds that such a significant adverse effect is likely to arise then consent for such a project must, other than in exceptional circumstances, be refused.

HRA applies to any plan or project with the potential to affect the qualifying interests of a Natura 2000 site, and subsequently, the conservation objectives and integrity of the site. The competent authority, Marine Scotland, has been advised by SNH that an HRA is required for the Neart na Gaoithe project (see SNH, 2010).

The requirement for HRA at a project level is further outlined in the Scottish Government's Plan for offshore wind development in territorial waters ('Blue Seas - Green Energy: A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters', see Marine Scotland, 2011a; 2011b; and 2011c), which also had an accompanying plan-level HRA.

SNH (2010) advises that the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) require the competent authority to (from SNH, 2010):

- Determine whether the proposal is directly connected with or necessary to site management for conservation;
- Determine whether the proposal is likely to have a significant effect on the site either individually or in combination with other plans or projects; and
- If so, then make an AA of the implications (of the proposal) for the site in view of that site's conservation objectives. A plan or project can only be consented if it can be ascertained that it will not adversely affect the integrity of a Natura 2000 site (subject to Regulation 49 considerations).

Although the proposal is not directly connected with, or necessary, to site management for conservation for any Natura 2000 sites, SNH has advised that as the project may have an LSE on certain site features Marine Scotland will therefore carry out an AA of the effects of the proposed development on potentially impacted Natura 2000 sites' features and conservation objectives.

- 17 Additionally the Wildlife and Countryside Act 1981 lists certain species afforded protection under the Birds Directive and Bern Convention in schedules to the Act. This was supplemented, following devolution, by the Nature Conservation (Scotland) Act 2004. Together these Acts provide additional protections to species and habitats that are important at national, regional and local levels. The Nature Conservation (Scotland) Act 2004 also allows for the creation of protected sites for nationally important features and the National Parks and Access to the Countryside Act 1949 allows for designation of sites of local importance.
- 18 The Marine Strategy Framework Directive (MSFD) is transposed into UK law through the UK Marine Strategy Regulations 2010. This commits the UK Government to produce an assessment of the current state and a description of what 'Good Environmental Status' means for UK waters and associated targets and indicators, to establish monitoring programmes, beginning in 2012.
- 19 There are also a number of developing measures relating to the management of the marine environment. The Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010 provide for the development of a marine spatial planning system, which will provide a planning framework for future marine development. These Acts also enable the creation of protected marine sites for nationally and regionally important marine species and habitats, known as MPAs. These measures are intended to fulfil Scotland's and the UK's international commitments to protection of habitats and species (such as under the OSPAR Convention) and contribute to some of the requirements of the MSFD. These are part of a wider strategy and suite of measures further outlined in Marine Scotland and the Scottish Government's 2011 document 'Strategy for Marine Nature Conservation in Scotland's Seas' (Marine Scotland and the Scottish Government, 2011a).

## 11.6 Species and Habitats of Nature Conservation Importance

### 11.6.1 Designated Sites

- 20 There are a number of sites in the Firth of Forth area and wider North Sea area that are designated as protected areas for nature conservation or biodiversity purposes. The vast majority of these are designated under the Habitats Regulations and are described here.

### 11.6.2 Special Protection Areas

- 21 The Birds Directive, transposed into Scottish law via the Habitats Regulations, the Wildlife and Countryside Act 1981 (as amended) and by the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) (for offshore sites beyond 12 NM), makes provision for the protection of habitats for endangered and migratory bird species. These measures allow classification of SPAs to ensure a coherent network of SPAs comprising all the most suitable territories for such species. Since 1994 all SPAs, combined with sites designated under the Habitats Directive, have formed part of the Natura 2000 network. There are currently 153 SPAs in Scotland designated for seabirds and waterfowl species of conservation importance (Scottish Government, 2011a).
- 22 As seabirds are highly mobile and each species has distinct behavioural, foraging and migratory patterns there is therefore no fixed distance from the project where birds and associated SPAs may or may not be affected. SNH has provided advice on which SPAs should be considered for HRA purposes (SNH, 2010). This list has been expanded to include sites noted for species recorded during site-specific surveys for the offshore site and its 8 km buffer and on the UK east coast between Hermaness (Shetland) and Spurn Point (Humberside). The full list of sites considered to have connectivity with the project area are listed in Box 1.6 (Figure 11.1 and 11.2) and Table 11.3 below, and further detail on the sites, including qualifying species and features, is provided in Appendix 11.2: Special Protection Areas with Connectivity to Neart na Gaoithe: Screening.

**Box 1.6 Habitats Regulations Appraisal: SPAs**

Scottish Natural Heritage has advised that several SPAs need consideration for HRA with respect to proposed development. The location of these sites is shown below, with further detail on each SPA in Appendix 11.2: Special Protection Areas with Connectivity to Neart na Gaoithe: Screening.

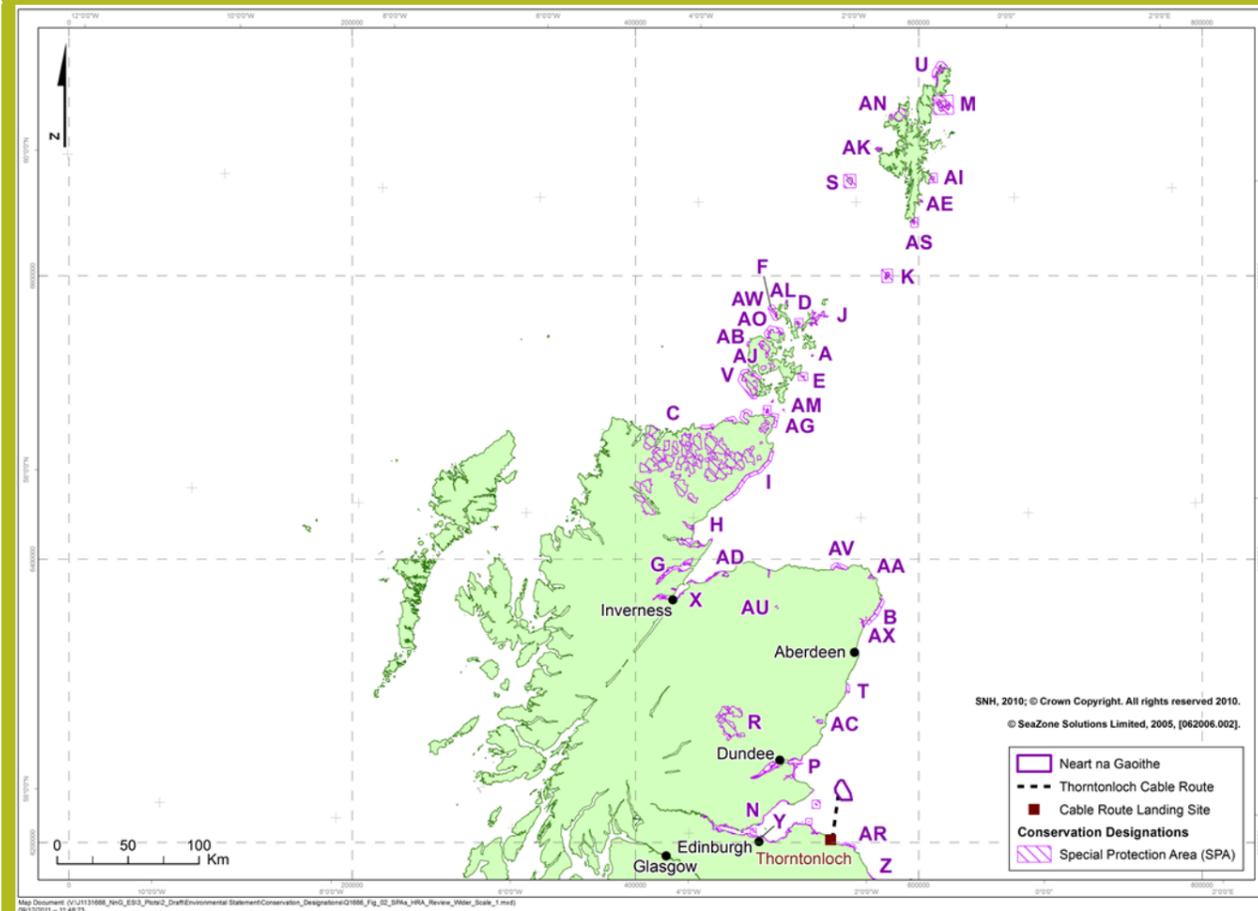


Figure 11.1: Special Protection Areas with potential connectivity to Neart na Gaoithe

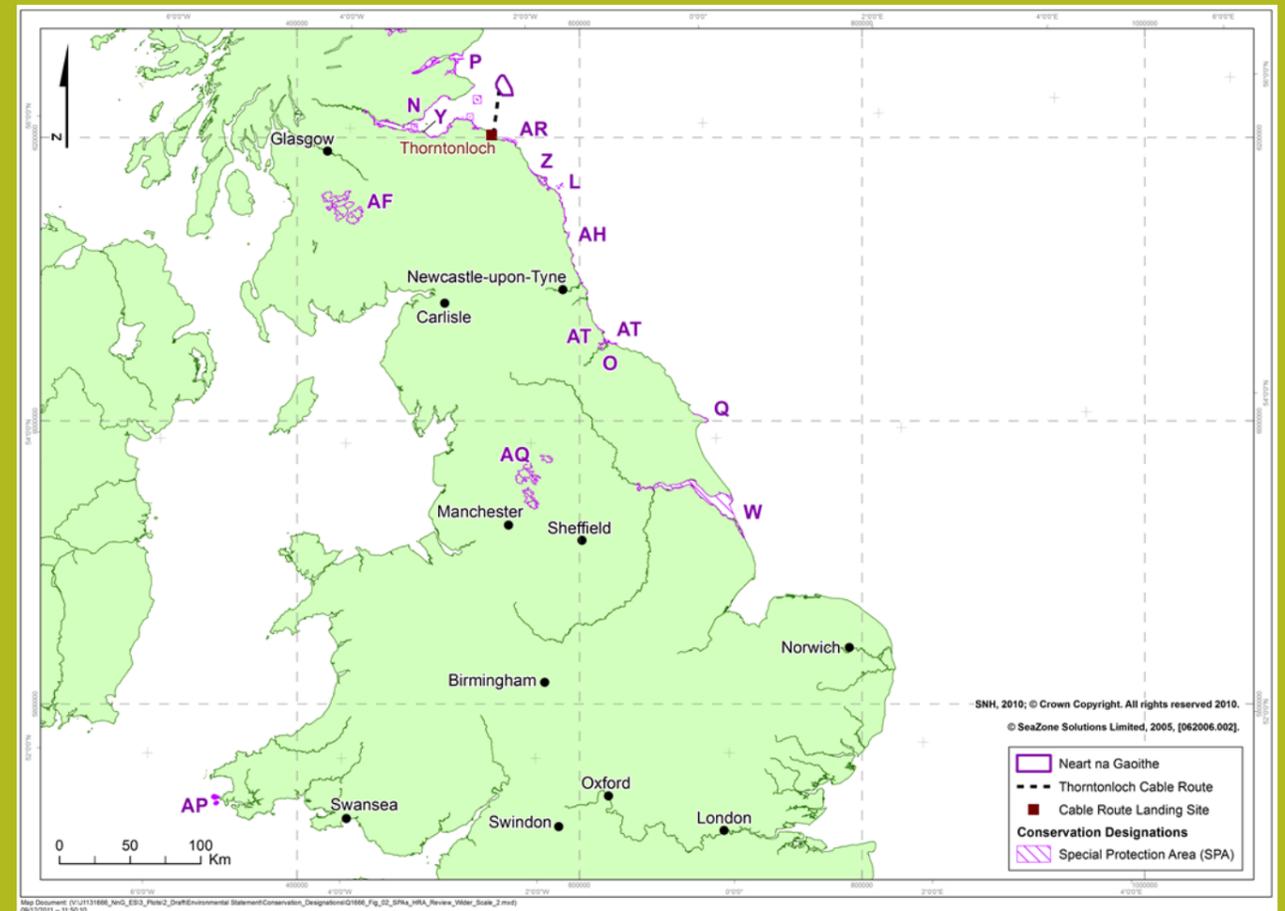


Figure 11.2: Special Protection Areas with potential connectivity to Neart na Gaoithe (continued)

Figure code and site			
<b>A</b>	Auskerry	<b>L</b>	Farne Islands
<b>B</b>	Buchan Ness to Collieston Coast	<b>M</b>	Fetlar
<b>C</b>	Caithness and Sutherland Peatlands	<b>N</b>	Firth of Forth
<b>D</b>	Calf of Eday	<b>O</b>	Firth of Forth Islands
<b>E</b>	Copinsay	<b>P</b>	Firth of Tay and Eden Estuary
<b>F</b>	Coquet Island	<b>Q</b>	Flamborough Head and Bempton Cliffs
<b>G</b>	Cromarty Firth	<b>R</b>	Forest of Clunie
<b>H</b>	Dornoch Firth and Loch Fleet	<b>S</b>	Foula
<b>I</b>	East Caithness Cliffs	<b>T</b>	Fowlsheugh
<b>J</b>	East Sanday coast	<b>U</b>	Hermaness, Saxa Vord and Valla Field
<b>K</b>	Fair Isle	<b>V</b>	Hoy
<b>X</b>	Inner Moray Firth	<b>W</b>	Humber Estuary
<b>Y</b>	Leith Docks/Imperial Docks Leith	<b>AG</b>	North Caithness Cliffs
<b>Z</b>	Lindisfarne	<b>AH</b>	Northumbria coast
<b>AA</b>	Loch of Strathbeg	<b>AI</b>	Noss
<b>AB</b>	Marwick Head	<b>AJ</b>	Orkney Mainland Moors
<b>AC</b>	Montrose Basin	<b>AK</b>	Papa Stour
<b>AD</b>	Moray and Nairn Coast	<b>AL</b>	Papa Westray (North Hill and Holm)
<b>AE</b>	Mousa	<b>AM</b>	Pentland Firth Islands
<b>AF</b>	Muirkirk and North Lowther Uplands	<b>AN</b>	Ronas Hill - North Roe and Tingon
		<b>AO</b>	Rousay
		<b>AP</b>	Skomer and Skokholm
		<b>AQ</b>	South Pennine Moors
		<b>AR</b>	St Abb's Head to Fast Castle
		<b>AS</b>	Sumburgh Head
		<b>AT</b>	Teesmouth and Cleveland Coast
		<b>AU</b>	Tips of Corsemaul & Tom Mor
		<b>AV</b>	Troup, Pennan and Lion Heads
		<b>AW</b>	West Westray
		<b>AX</b>	Ythan Estuary, Sands of Forvie & Meikle Loch
		<b>AM</b>	Pentland Firth Islands
		<b>AS</b>	Sumburgh Head

Table 11.2: SPAs with potential connectivity to Neart na Gaoithe

- 23 Based on work carried out by the JNCC into spatial analyses of survey data collected around selected seabird colonies (McSorley *et al.*, 2003) the JNCC recommended marine extensions to existing seabird colony SPA boundaries for certain species. As a result several SPAs were extended in September 2009 to include marine areas adjacent to colonies. The boundaries of SPAs described and assessed in this ES include these extensions.
- 24 Additionally, JNCC has identified areas which might be considered for extensions or new areas; these include Area of Search (AoS) for waterbirds. There are two AoS for waterbirds currently subject to further analysis in the areas surrounding Neart na Gaoithe, in the Firths of Forth and Tay (Scottish Government, 2011a). Although not classified as SPAs, these sites are subject to further analysis and future areas could be identified and classified as SPAs (Scottish Government, 2011a).

**11.6.2.1 Special Areas of Conservation**

- 25 The Habitats Directive (and transposing regulations) requires that Member States designate protected sites where specific habitats (or habitats of specific species) are present in sufficient area or numbers.
- 26 In Scotland relevant sites containing habitats and species as listed in Annexes to the Habitats Directive are identified by the Scottish Government and recommended to the EC for designation as SACs. SACs can have several qualifying features including a range of habitats and species.
- 27 There are no designated SACs within the offshore works area for Neart na Gaoithe. However, SNH has advised of certain SACs and qualifying features with which the Neart na Gaoithe site may have ecological connectivity. The relevant sites identified by SNH have qualifying features including migratory species, such as marine mammals or diadromous fish, which have the potential to be affected by the project (see SNH, 2010). Further information on each of the listed species is given in Chapter 13: Marine Mammals and Chapter 15: Fish and Shellfish Ecology. Box 1.7, Table 11.4 and Figure 11.3 below illustrate the SACs and their qualifying features.

**Box 1.7 Habitats Regulations Appraisal: SACs**

Scottish Natural Heritage has advised that several SACs need consideration for HRA with respect to potential development within the Neart na Gaoithe offshore development site and cable route (SNH, 2010). These are shown in the figure below and detailed in Table 11.3.

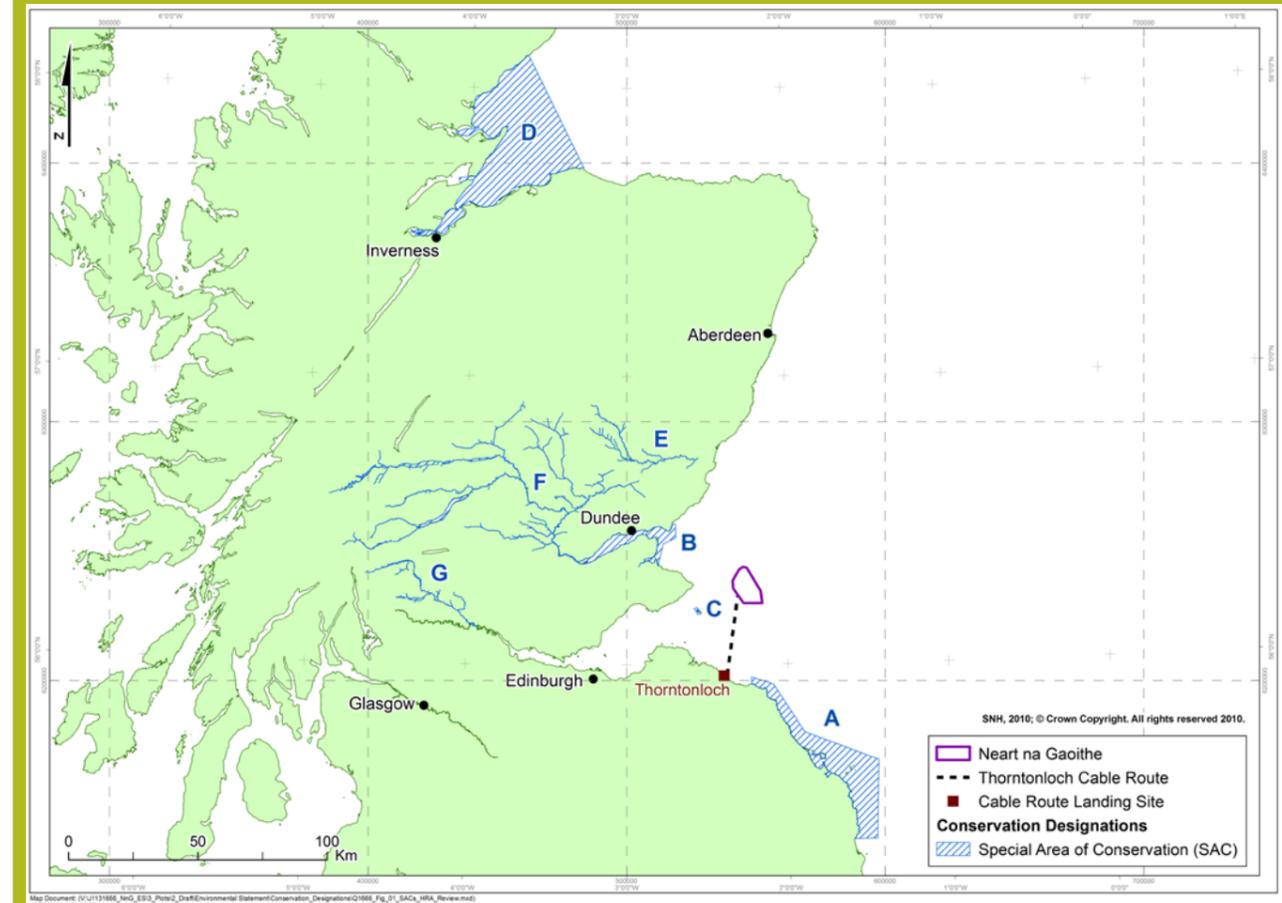


Figure 11.3: SACs with connectivity to the Neart na Gaoithe site (Source: SNH, 2010)

Figure code	SAC	Site description and reasons for designation (qualifying and other)		Qualifying features with connectivity to neart na gaoithe (as advised by SNH, 2010)
		Habitats	Species	
A	Berwickshire and North Northumberland Coast SAC	<p><i>Annex I qualifying habitats:</i></p> <ul style="list-style-type: none"> <li>Sea inlets;</li> <li>Tidal rivers;</li> <li>Estuaries;</li> <li>Mudflats and sandflats not covered by seawater at low tide;</li> <li>Reefs and sea caves;</li> <li>Lagoons ; and</li> <li>Several coastal/terrestrial habitats including salt marshes, pastures, steppes, dunes, sea cliffs and machair.</li> </ul>	<p><i>Annex II qualifying species</i></p> <ul style="list-style-type: none"> <li>Grey seal <i>Halichoerus grypus</i></li> </ul>	<ul style="list-style-type: none"> <li>Grey seal <i>H.grypus</i></li> </ul>
B	Firth of Tay and Eden Estuary SAC	<p><i>Annex I qualifying habitats:</i></p> <ul style="list-style-type: none"> <li>Estuaries</li> </ul> <p><i>Other Annex I habitats:</i></p> <ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Mudflats and sandflats not covered by seawater at low tide.</li> </ul>	<p><i>Annex II qualifying species</i></p> <ul style="list-style-type: none"> <li>Common seal <i>Phoca vitulina</i></li> </ul>	<ul style="list-style-type: none"> <li>Common seal <i>P. vitulina</i></li> </ul>
C	Isle of May SAC	<p><i>Other Annex I habitats:</i></p> <ul style="list-style-type: none"> <li>Reefs</li> </ul>	<p><i>Annex II qualifying species:</i></p> <ul style="list-style-type: none"> <li>Grey seal <i>H. grypus</i> (noted as largest east coast breeding colony in Scotland, 4<sup>th</sup> largest in the UK)</li> </ul>	<ul style="list-style-type: none"> <li>Grey seal <i>H. grypus</i></li> </ul>
D	Moray Firth SAC	<p><i>Other Annex I habitats:</i></p> <ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by seawater all the time</li> </ul>	<p><i>Annex II qualifying species:</i></p> <ul style="list-style-type: none"> <li>Bottlenose dolphin <i>Tursiops truncatus</i> (noted as the only resident population in the North Sea)</li> </ul>	<ul style="list-style-type: none"> <li>Bottlenose Dolphin <i>T. truncatus</i></li> </ul>
E	River South Esk SAC		<p><i>Annex II qualifying species</i></p> <ul style="list-style-type: none"> <li>Freshwater pearl mussel <i>Margaritifera margaritifera</i>; and</li> <li>Atlantic salmon <i>Salmo salar</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Freshwater pearl mussel <i>M.margaritifera</i>; and</li> <li>Atlantic salmon <i>S.salar</i>.</li> </ul>
F	River Tay SAC	<p><i>Other Annex I habitats:</i></p> <ul style="list-style-type: none"> <li>Oligotrophic to mesotrophic standing waters</li> </ul>	<p><i>Annex II qualifying species:</i></p> <ul style="list-style-type: none"> <li>Freshwater pearl mussel <i>M. margaritifera</i></li> <li>Atlantic salmon <i>S. salar</i></li> </ul> <p><i>Other Annex II species:</i></p> <ul style="list-style-type: none"> <li>Sea lamprey <i>Petromyzon marinus</i>;</li> <li>Brook lamprey <i>Lampetra planeri</i>;</li> <li>River lamprey <i>Lampetra fluviatilis</i>; and</li> <li>Otter <i>Lutra lutra</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Freshwater pearl mussel <i>M. margaritifera</i>;</li> <li>Atlantic salmon <i>S. salar</i>;</li> <li>Sea lamprey <i>P. marinus</i>; and</li> <li>River lamprey <i>L. fluviatilis</i>.</li> </ul>
G	River Teith SAC	<p><i>Annex II qualifying species</i></p> <ul style="list-style-type: none"> <li>Sea lamprey <i>P. marinus</i>;</li> <li>Brook lamprey <i>Lampetra planeri</i>; and</li> <li>River lamprey <i>L. fluviatilis</i>.</li> </ul>	<p><i>Other Annex II species:</i></p> <ul style="list-style-type: none"> <li>Atlantic salmon <i>S. salar</i></li> </ul>	<ul style="list-style-type: none"> <li>Sea lamprey <i>P. marinus</i>;</li> <li>River lamprey <i>L. fluviatilis</i>; and</li> <li>Atlantic salmon <i>S.salar</i>.</li> </ul>

Table 11.3: SACs near the Neart na Gaoithe offshore works area with potential for connectivity given future development of the site, including connecting features (Sources: JNCC, 2011; SNH, 2010)

11.6.2.2 Other Sites

OSPAR and Ramsar Sites

28 Some international conventions allow creation of protected sites; OSPAR signatory countries have identified OSPAR MPAs and signatories to the Ramsar Convention have identified Ramsar sites (Wetlands of International Importance, see Appendix 11.1: Nature Conservation Agreements and Conventions). For EU member states, these sites are also protected under the more stringent Birds and Habitats Directives and in Scotland all such sites are either SACs or SPAs and so interest features are protected under the Habitats Regulations. Those sites with dual designations are detailed in Table 11.4.

Site	Primary designation	Further international designations
Berwickshire and North Northumberland	SAC	OSPAR MPA
Firth of Tay and Eden Estuary	SAC	OSPAR MPA
Isle of May	SAC	OSPAR MPA
Moray Firth	SAC	OSPAR MPA
Fala Flow	SPA	Ramsar site
Farne Islands	SPA	Ramsar site
Firth of Forth	SPA	Ramsar site
Firth of Tay and Eden Estuary	SPA	Ramsar site
Loch Leven	SPA	Ramsar site
Lindisfarne	SPA	Ramsar site
Loch of Skene	SPA	Ramsar site
Montrose Basin	SPA	Ramsar site
Muir of Dinnet	SPA	Ramsar site
Upper Solway Flast and marshes	SPA	Ramsar site
Ythan Estuary and Meikle Loch	SPA	Ramsar site

Table 11.4: Natura 2000 sites with connectivity to the Neart na Gaoithe development with additional designations

Intertidal and Terrestrial Sites

29 A network of Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs) in Scotland are managed under the provisions of the Nature Conservation (Scotland) Act 2004 and the Wildlife and Countryside Act 1981 (as amended). These protect species and habitats of nature conservation importance. However they are largely terrestrial and do not extend below the low water mark and are therefore unlikely to be affected by offshore development. Similarly, Local Nature Reserves (LNRs) may be designated for locally important habitats and features under the National Parks and Access to the Countryside Act 1949.

30 There are a number of SSSIs located along the coast of eastern Scotland which encompass a variety of intertidal habitats. The closest of these is the Isle of May SSSI, which also covers an area designated as an SAC. The site has grey seal as a notified feature which aligns with the SAC qualifying feature. The remaining SSSIs along the coast are notified for geological features, habitats and seabirds. Many are also designated as SPAs and any connectivity with these is as discussed above. No SSSIs fall within the export cable route for Neart na Gaoithe (further information on the onshore cable route is given in the onshore ES).

Marine Sites

31 Very little of the UK's marine environment is currently afforded statutory protection. Other than sites protected at an international level (marine Natura 2000 sites), there are very few protected sites: three national marine nature reserves, one marine conservation zone and two no take zones. None of these falls within the offshore works area for Neart na Gaoithe.

32 However, the Marine and Coastal Access Act 2009 and Marine (Scotland) Act 2010 provide for the creation of a new network of national MPAs. MPAs are designed to conserve nationally and regionally important marine wildlife, habitats, geology and geomorphology and can be designated anywhere in waters surrounding Scotland

out to the 200 NM limit (Marine Scotland, 2011d; Marine Scotland and the Scottish Government, 2011a). These new sites, along with existing marine Natura 2000 sites and other area based measures such as fisheries management areas, are intended to form a coherent network of MPAs to meet Scotland and the UK's commitments under the OSPAR convention.

33 MPAs are being identified through the Scottish MPA project. Marine Scotland has produced a guidance document for site selection, outlining a stepwise process involving identification of features, regional search areas and consideration of ecological coherence, network functioning and socio-economic information (Marine Scotland *et al.*, 2011b). The Scottish MPA project expects to have options for sites developed by the end of 2012 and as such no sites have been designated yet (May 2012) (Marine Scotland, 2012; Marine Scotland, 2011d).

34 The guidance includes a list of Nature Conservation MPA search features (Marine Scotland *et al.*, 2011b). Progress so far has resulted in these features being prioritised for different regions of Scotland's seas, with some MPA search features considered already protected by existing measures (Carruthers *et al.*, 2011). The Scottish MPA project has subsequently identified initial *Nature Conservation MPA Search Locations* as the first areas in which to apply the MPA site selection guidelines (Marine Scotland, 2012; Marine Scotland *et al.*, 2011b; Marine Scotland, 2011e). There are no search locations within the Neart na Gaoithe offshore works area, however there is one east of the offshore works area, in the outer Firth of Forth.

35 Some MPA search features have been identified as being present in the project area as a result of baseline ecological assessment work to inform this ES (refer to Chapter 14: Benthic Ecology). The MPA site selection guidance explains that presence of these features does not mean that an MPA will necessarily be designated in the area; the likelihood of designation will be determined by a number of factors including whether features are represented at an appropriate scale and whether a site will deliver regional and national ecological coherence (Marine Scotland *et al.*, 2011).

36 Table 11.5 below illustrates the MPA search features identified in the Neart na Gaoithe offshore works area, with notes on the prioritisation of these under the MPA project.

MPA search feature and component biotope/species	Biotope code/species Name	Presence in Neart na Gaoithe site, notes on search feature priority status (from Carruthers <i>et al.</i> , 2011; Marine Scotland, 2011e) and context
Burrowed mud: seapens and burrowing megafauna in circalittoral fine mud	SS.SMu.CfiMu.SpMmeg	<ul style="list-style-type: none"> <li>Recorded in baseline benthic ecology surveys through grab samples and photo/video analysis within main site and along offshore cable route (see Chapter 14: Benthic Ecology);</li> <li>Remains a search feature for future MPA search locations and prioritised in the East (and West) Scottish sea regions; however</li> <li>Analysis of Mapping European Seabed Habitats (MESH) datasets indicates that this is a very common habitat across the North Sea (see Chapter 14: Benthic Ecology).</li> </ul>
Ocean quahog	<i>Arctica islandica</i>	<ul style="list-style-type: none"> <li>Several occurrences recorded in the offshore site and export cable corridor (see Chapter 14: Benthic Ecology); however</li> <li>Considered adequately represented in the MPA network subject to development of MPAs from existing search areas.</li> </ul>
Sandeels	<i>Ammodytes marinus</i> and <i>A. tobianus</i>	<ul style="list-style-type: none"> <li><i>A. tobianus</i> recorded scarcely in the offshore works area and sediments present in the area assessed for potential as sandeel habitat with low likelihood of occurrence (see Chapter 14: Benthic Ecology); and</li> <li>Remains a search feature for future MPA search locations but not in the East region, other existing area-based measures are considered to afford protection for this region.</li> </ul>

Table 11.5: Nature Conservation MPA search features recorded in the Neart na Gaoithe offshore works area or historically recorded in the area (Source: Marine Scotland *et al.*, 2011)

### 11.6.3 Protected Species

37 There are a number of species of conservation importance that are afforded a level of protection outside designated sites. These are species listed under the schedules of the Habitats Regulations and the Wildlife and Countryside Act 1981 (as amended), including all cetaceans and wild birds. Additionally, common seals are protected under the Marine (Scotland) Act 2010. All are considered to require protection from deliberate harm, whether they are a qualifying feature of a protected site or not, and as such licensing systems are in place to only allow certain activities which may affect them.

38 A number of such protected species have been recorded in the Neart na Gaoithe offshore works area, or are thought to have the potential for a level of ecological dependency on the site. These are described below in the context of the development.

#### 11.6.3.1 Birds

39 All wild birds in Scotland, as described in the Birds Directive, are protected under the Wildlife and Countryside Act 1981 (as amended) against deliberate or reckless killing, injury or disturbance. Further information on the species recorded in the site and region, those with a potential ecological link to the site, and potential impacts on individual species is presented in Chapter 12: Ornithology.

#### 11.6.3.2 Marine Mammals

40 European Protected Species are animals or plants listed in Schedules 1 and 4 of the Habitats Regulations or in Annex IV of the Habitats Directive. Species listed include all species of dolphins, porpoises and whales. Further information on EPS is given in Chapter 13: Marine Mammals.

41 Several species of marine mammal have been recorded in the offshore site area and wider region surrounding the development, both historically and through site-specific surveys. Detailed information species found within, and connected to, the development and the potential impact on them is provided in Chapter 13: Marine Mammals.

#### 11.6.3.3 Bats

42 All bat species are listed under the Habitats Regulations and both they and their roosts are protected under the Regulations. Although a terrestrial species, bats may be affected by the project as they may be present in the site, either transiting across or migrating through the offshore works area. Although no bats were recorded in any of the boat-based bird surveys undertaken on site and published evidence indicates that bats are not regularly observed offshore, bats are considered to be potentially at risk from onshore wind farms and there is considerable guidance on the issue (e.g., guidance from the EC and Natural England (NE, 2009) and Rodrigues *et al.*, 2008).

43 European Commission Guidance relating to onshore wind turbines outlines potential impacts, including potential collision with operational turbines or rotors or a loss of migration corridor, and risk of barotrauma from ultrasonic emissions (EC, 2010). Other potential impacts relate to loss of roosts, hunting habitats or feeding grounds, which are not relevant to offshore sites.

44 There are nine bat species found regularly in Scotland (SNH, 2011d). Appendix 11.3: Overview of Potential Impacts on Bats provides more detail on these species and their potential interaction with the project following published guidance on their sensitivities, migration and behaviour. Three species are considered to be at risk of a possible impact from the project, as summarised in Table 11.6 below, based on their migration routes and known interactions with wind turbines. However, a desk based review (as summarised below) indicates that there is not likely to be a significant impact on any of these species.

Bat Species	Vulnerability to offshore wind farms (from Natural England, 2009 and others)	Information on likely interaction with the project
Noctule bat <i>Nyctalus noctula</i>	High risk/sensitivity	<ul style="list-style-type: none"> <li>Considered largely sedentary in the UK (Jones <i>et al.</i>, 2009) and very few records in Scotland in comparison with other parts of the UK and North West Europe; and</li> <li>No significant interaction (pathway) and therefore no significant impact.</li> </ul>
Liesler's bat <i>N. leisleri</i>	High risk/sensitivity	<ul style="list-style-type: none"> <li>There is little evidence that there is a regular migration of Liesler's bat across the North Sea;</li> <li>DNA analysis indicates that there is little or no gene flow between the European populations of Liesler's bats and those in the UK (Russ, 2008); and</li> <li>No significant interaction (pathway) and therefore no significant impact.</li> </ul>
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	High risk/sensitivity	<ul style="list-style-type: none"> <li>No records of Nathusius' pipistrelle from southeast Scotland (National Biodiversity Network (NBN, 2011), and Appendix 11.3: Overview of Potential Impacts on Bats);</li> <li>Likely to fly above rotor height; and</li> <li>No significant interaction (pathway) and therefore no significant impact.</li> </ul>

Table 11.6: Bat species of high vulnerability to the development and information on likely interaction with the project

## 11.6.4 Other Species and Habitats of Nature Conservation Interest

### 11.6.4.1 UK Biodiversity Action Plan Habitats

45 The UK Biodiversity Action Plan (UK BAP) has produced a list of species of importance across the UK as a response to commitments under the Convention of Biological Diversity (Scottish Government, 2011b). UK BAP species and features within the Firth of Forth include:

- Ross worm *Sabellaria spinulosa* reefs;
- Horse mussel *Modiolus modiolus* beds;
- Native oysters *Ostrea edulis*;
- Saltmarsh; and
- Sea grass beds.

46 None of these species or features were found in the Neart na Gaoithe offshore works area or survey areas. The UK BAP habitat 'mud habitat in deep water' corresponds closely to the MPA search feature of burrowed mud. UK BAP intertidal habitats 'blue mussel bed on sediment', 'intertidal under-boulder communities' and 'pebble, cobble and boulder aggregations'.

### 11.6.4.2 Scottish Biodiversity List and Priority Marine Features

47 The Scottish Biodiversity list is a list of species and habitats important to Scotland (SNH, 2011c). The list's marine section contains all the MPA search features and a shortlist of important features has been created: the Priority Marine Feature (PMF) list. PMFs form the basis of the MPA search features, and the final list is currently in draft format. Other than the MPA search features already identified, no PMFs have been identified in the proposed offshore works area.

### 11.6.4.3 Important Bird Areas

48 A further non-statutory designation is that of Important Bird Areas (IBAs). IBAs have been highlighted by Birdlife International (of which the RSPB is a member) as areas important for bird conservation. As of 2009, nearly 11,000 sites in some 200 countries and territories have been identified as Important Bird Areas (Birdlife International, 2012). There are several IBAs in the area highlighted in Box 1.6 above, the majority of which overlap with SPAs or SSSIs in intertidal or terrestrial areas. Further information on IBAs is given in Chapter 12: Ornithology.

### 11.6.4.4 Bird Species of Conservation Concern

49 The British Trust for Ornithology (BTO) and Royal Society for the Protection of Birds (RSPB) regularly assess the status of birds in the UK. Species are assessed according to their level of conservation concern on a red-amber-green scale. Further information on specific species is given in Chapter 12: Ornithology.

## 11.7 Impact Assessment: Special Protection Areas

### 11.7.1 Screening in Sites and Assessing Connectivity

50 A list of SPAs with potential connectivity to Neart na Gaoithe has been set out above and is presented in further detail in Appendix 11.2: Special Protection Areas with Connectivity to Neart na Gaoithe: Screening.

51 In order to make an assessment of the proposed project's potential adverse effects that may impact populations from these SPAs, the relative importance of the site and degree of connectivity between birds from these SPAs and the offshore site needs to be considered.

52 Following the high level screening assessment for potential Likely Significant Effects (Appendix 11.2) an assessment of potential adverse effects has been undertaken.

53 Many of the SPAs identified as having potential connectivity are some distance from the proposed project area in the Firth of Forth. However, of these SPAs, three are within (or almost so) the mean maximum breeding season foraging range of the majority of qualifying species for the SPAs (Thaxter *et al.*, 2012). These are:

- Forth Islands SPA;
- St Abb's Head to Fast Castle SPA; and
- Fowlsheugh SPA.

54 The remaining SPAs considered are beyond the mean maximum foraging range for all but fulmar and are therefore too distant from the proposed offshore site for individuals from qualifying species populations to be regularly present during the breeding season. However, at times of the year when birds are not attending breeding colonies, there is potential for moderate to strong connectivity for some qualifying species populations of additional SPAs. These SPAs are:

- West Westray;
- Calf of Eday;
- Rousay;
- Copinsay SPA;
- Hoy SPA;
- North Caithness Cliff SPA;
- East Caithness Cliffs SPA;
- Troup, Pennan and Lion's Heads SPA;
- Buchan Ness to Collieston Coast SPA;
- Farne Islands SPA; and
- Coquet Island SPA.

55 More detailed information on the degree of connectivity has been quantified following the baseline environment identified in Chapter 12: Ornithology (based on site-specific survey information). Connectivity was expressed in terms of the proportion of birds that are on average present in the area of interest that are likely to be from the population of interest. In this case, the area taken into consideration was the offshore works area buffered to 1 km and the SPA population. This is calculated according to the most likely of several generic scenarios and means that connectivity is expressed as a more quantitative measure than the long list as presented in Appendix 11.2: SPAs with Connectivity to Neart na Gaoithe: Screening.

56 Four connectivity scenarios are considered and are presented in the individual HRA assessments for each SPA:

- **Connectivity Scenario 1**

This scenario is used for estimating the extent of connectivity during the colony attendance part of the breeding season. It is only used for the closest SPA, the Forth Islands SPA. Under this scenario it is assumed that all individuals in adult plumage present in the offshore site are from the SPA.

- **Connectivity Scenario 2**

This scenario is also used for estimating connectivity in the colony-attendance period. The birds present in the offshore site are assumed to originate from all breeding colonies that are within 110% of the mean maximum foraging range (MMFR) distance away, and occur in proportion to the inverse of this distance, weighted by colony size. This scenario is used for estimating breeding season impacts. The reason for the use of 110% MMFR rather than 100% is to incorporate some additional caution by not screening out SPAs for a species that are slightly further away than the MMFR distance. In practice this only affects three

species at one SPA (Fowlsheugh SPA), using the 110% threshold means these are screened in and therefore the assessment process is more cautious.

- **Connectivity Scenario 3**

This scenario is used for estimating the connectivity for seabird species in the non-breeding period of the year. At this time of year, for most seabird species the birds present in the offshore site are likely to consist of a mixture of individuals from the regional breeding population and birds from breeding populations further afield, e.g., more northern breeding areas including those in other countries such as Norway and Iceland. To estimate the degree of connectivity, information is required on the likely ratio of regional breeding to non-regional breeding birds present. Information is also required on the proportion of the regional breeding component present that is likely to be from the SPA in question. Unfortunately, information on both these things is generally unknown, although reasonable approximations can be made for most species. Data from ringing studies can broadly indicate the likely linkage at a broad scale to different breeding areas. Birds from breeding colonies within the region are assumed to occur in proportion to the size of colonies in the region.

Ringing data may indicate that some of the regional breeding population of a species commonly winter outside the region and that birds from other breeding grounds are also likely to be present. On this basis, it may be assumed that 50% of the birds present in the non-breeding period are from regional breeding colonies. If the SPA in question has 30% of the regional breeding population of the species, then the estimated connectivity to that SPA in the non-breeding period would be 15% (i.e., 50% x 30%).

- **Connectivity Scenario 4**

This scenario is used for waders and wildfowl. It is assumed that all individuals from an SPA under consideration fly through the wind farm twice per year. This is a worst-case scenario, although, as the magnitude of predicted collisions under this scenario is in all cases very low, refining the assessment with more realistic scenarios is not required.

## 11.7.2 In-Combination Effects on Screened-In SPAs

- 57 As outlined above, there are a number of projects, programmes, plans or activities that could have an impact on SPA qualifying species in-combination with impacts arising from Neart na Gaoithe.
- 58 Two other offshore wind farms are proposed in the Forth and Tay region: Inch Cape Offshore Wind Farm and the Firth of Forth Round 3 Zone 2 Wind Farm. Reports for the first year of survey work for these developments provide information on the numbers of birds seen and make some preliminary assessment of likely impacts.
- 59 Outside the Firth of Forth and Tay area there are two proposed offshore wind farms in the Moray Firth (Beatrice Offshore Wind Farm and the Moray Firth Zone Wind Farm). These proposals have been considered where applicable when assessing impacts on SPAs, as summarised below. In addition, an application has been submitted for the proposed Aberdeen Offshore Wind Farm (AOWF) in Aberdeen Bay, approximately 100 km to the north of the proposed Neart na Gaoithe offshore site. Based on the proposed scale of AOWF (11 turbines) and the initial findings in the project's Environmental Statement, it was concluded that impacts from Aberdeen Offshore Wind Farm would not significantly add to the cumulative effects from Neart na Gaoithe, Inch Cape and the Firth of Forth Round 3 Zone developments and so AOWF is not considered in the assessment of cumulative impacts.
- 60 Other activities such as shipping, oil and gas, dredging and aggregates are either absent from the potential area of cumulative impact or occur at a low level and are therefore predicted not to have any cumulative or in-combination impacts for the purposes of assessment of in-combination impacts under HRA.
- 61 Further information on the approach to cumulative impact assessment under EIA is provided in Chapter 12: Ornithology and Appendix 12.1: Ornithology Technical Report.

## 11.7.3 Summary of Impacts on SPAs: Information to Inform an Appropriate Assessment

### 11.7.3.1 Overview Information

62 Each SPA with connectivity to Neart na Gaoithe has individual conservation objectives. However some of these are common to all breeding seabird SPAs. These are:

- 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; and
  - No significant disturbance of the species.

### 11.7.3.2 Likely Significant Effects on SPAs

63 The likely significant effects (LSE) on the qualifying features (species) of SPAs which are likely to be affected by future development include:

- Displacement and disturbance;
- Barrier effect; and
- Collision mortality.

### 11.7.3.3 SPA Information

- 64 These likely significant effects could impact upon SPA qualifying species, including through impacts in combination with those arising from other plans or projects, and therefore potentially the integrity of the individual SPAs. The full assessment of these impacts is presented in Chapter 12: Ornithology (which includes information on the methodology used and refers to a number of Technical Appendices where more detailed information is presented on modelling).
- 65 For the purposes of Habitats Regulations Appraisal, the following section summarises the assessed impacts (LSEs) for SPAs and their qualifying features and forms the basis of the information to inform an AA.
- 66 Information as to the Rochdale Envelope parameters was assessed and the effects arising from the development, the pathways and receptors impacted considered. Further detail on the expected impacts and data and literature sources are provided in Chapter 12: Ornithology.

**Box 1.8 Buchan Ness to Collieston Coast SPA**

*Site Information*

Topic	Information								
<b>Qualifying features of site and possible connectivity</b>  SPA is 114 km north of Neart na Gaoithe	Qualifying feature	Mean maximum foraging range	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason		
	Seabird assemblage, breeding		95,000 i	Unfavourable. No change.					
	Fulmar, breeding *	400 km	1,765 p	Unfavourable. Declining.	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.		
	Shag, breeding*	14.5 km	1,045 p	Unfavourable. No change.	No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys.		
	Herring gull, breeding *	61.1 km	4,292 p	Unfavourable. No change.	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site only in non-breeding period.		
	Kittiwake, breeding *	60.0 km	30,452 p	Unfavourable. No change.	No	Yes			
	Guillemot, breeding *	84.2 km	8,640 i	Favourable. Declining.	No	Yes			
*species qualifies as a seabird assemblage component only. i = individuals; p = pairs.  Data from the baseline surveys indicate that all of the seabird species that are qualifying interests at the Buchan Ness to Collieston Coast SPA occur in the offshore site.  However, with the exception of fulmar the mean maximum foraging ranges during the breeding season of qualifying species are exceeded by the distance from the SPA to the offshore site; (114 km). Therefore it is concluded that fulmar is the only qualifying species at the Buchan Ness to Collieston Coast SPA that is likely to be affected during the breeding season by the proposed development.									
<b>Importance of site to connected species</b>	The importance of the proposed offshore site foraging to qualifying populations at the Buchan Ness to Collieston Coast SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2 (CS2), and using Connectivity Scenario 3 (CS3) for other periods of the year.				The only qualifying SPA populations that the offshore site (buffered to 1 km) is likely to be important for are kittiwake and guillemot, during the post-breeding period. The numbers present on average at other times of year and for other qualifying species at all times of year are below 0.5% of the SPA at-sea population and therefore are very unlikely to be enough to lead to significant effects.				
	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site			
		Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)*
	Fulmar	1.5%	NA	NA	0.2%	<0.1% (1)	NA	NA	<0.1% (<1)
	Herring gull	None	NA	NA	3.4%	none	NA	NA	0.13% (8)
Kittiwake	None	NA	26.7% (CS3a)	13.0% (CS3b)	none	NA	1.2% (325)	<0.1% (15)	
Guillemot	None	11.3%	11.3%	11.3%	none	0.2% (56)	1.7% (578)	0.3% (99)	
*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.									

<b>Conservation objectives of site</b>	<p>The conservation objectives for Buchan Ness to Collieston Coast SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>
--	--

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of likely significant effect															
<b>Displacement and Disturbance</b>	<p>Based on information from existing studies, herring gull and kittiwake are likely to experience up to 25% displacement, guillemot up to 50% displacement and fulmar up to 100% displacement (there is limited evidence of displacement level, so a worst-case is assumed). The value of the wind farm footprint as foraging habitat for these species will be reduced by up to these percentages.</p> <p>Given the very large areas of foraging habitat available, the large natural spatial and temporal variations in prey abundance and the birds' abilities to cope with these, it is unlikely that losses of potential foraging resource of less than 1% would result in a discernible adverse effect on population and so such impacts are classed as having no adverse effect.</p> <p>For all qualifying species other than guillemot, irrespective of the displacement rate, the offshore site is of very low value to the SPA population and, therefore, even if all individuals were displaced the impact on the population is likely to be negligible. Therefore there is predicted to be no adverse effect for fulmar, herring gull or kittiwake.</p> <p>For guillemot, if 50% of individuals were displaced from the offshore site buffered to 1 km, it is estimated that this would amount to an effective loss of 0.80% in the foraging resources used in the post-breeding period. Guillemots are likely to have low-moderate sensitivity to displacement and disturbance at this time of year because this is when adults undergo wing moult and become flightless for several weeks.</p> <p>The estimated impacts are predicted to affect close to 1% of the SPA population. It is predicted that displaced birds will be able to relocate elsewhere and the loss of potential foraging habitat during the non-breeding season for less than 1% of the breeding guillemot SPA population is unlikely to cause a significant effect.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e91e63; color: white;">Qualifying feature</th> <th style="background-color: #e91e63; color: white;">Time of year (assumed connectivity scenario)</th> <th style="background-color: #e91e63; color: white;">% of SPA population in offshore site and buffer</th> <th style="background-color: #e91e63; color: white;">Assumed displacement rate</th> <th style="background-color: #e91e63; color: white;">Estimated % of at-sea population displaced</th> </tr> </thead> <tbody> <tr> <td>Kittiwake</td> <td>Post breeding (CS3a)</td> <td>1.2%</td> <td>25%</td> <td>0.3%</td> </tr> <tr> <td>Guillemot</td> <td>Post breeding (CS3)</td> <td>1.7%</td> <td>50%</td> <td>0.8%</td> </tr> </tbody> </table>	Qualifying feature	Time of year (assumed connectivity scenario)	% of SPA population in offshore site and buffer	Assumed displacement rate	Estimated % of at-sea population displaced	Kittiwake	Post breeding (CS3a)	1.2%	25%	0.3%	Guillemot	Post breeding (CS3)	1.7%	50%	0.8%
Qualifying feature	Time of year (assumed connectivity scenario)	% of SPA population in offshore site and buffer	Assumed displacement rate	Estimated % of at-sea population displaced												
Kittiwake	Post breeding (CS3a)	1.2%	25%	0.3%												
Guillemot	Post breeding (CS3)	1.7%	50%	0.8%												
<b>Barrier Effect</b>	<p>The large distance (114 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is predicted that the proposed project will not cause a significant barrier effect to birds from the Buchan Ness to Collieston Coast SPA.</p>															
<b>Collision Mortality</b>	<p>The only qualifying species populations that are predicted have the potential to be adversely affected by collision mortality are herring gull and kittiwake. For all other qualifying species, the proportion of flight activity recorded during baseline surveys at rotor height was either zero or negligible and therefore no appreciable mortality was predicted by Collision Risk Modelling (CRM).</p> <p>Connectivity Scenario 3 was used to estimate the proportion of annual collisions predicted by CRM to be caused by the proposed development that are likely to involve adults from the Buchan Ness to Collieston Coast SPA qualifying populations of herring gull and kittiwake.</p> <p>The breeding populations of herring gull and kittiwake are categorized as being in unfavourable condition and therefore the potential increase in mortality predicted by the CRM may increase the population declines, based on the most adverse wind farm design. However, the incremental increase of less than 1% of the baseline mortality rate for both species is very small and not predicted to adversely affect the current condition of the population.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e91e63; color: white;">Qualifying feature</th> <th style="background-color: #e91e63; color: white;">Time of year (assumed connectivity scenario)</th> <th style="background-color: #e91e63; color: white;">Estimated deaths per year for 98% avoidance rate</th> <th style="background-color: #e91e63; color: white;">% change in baseline mortality rate</th> </tr> </thead> <tbody> <tr> <td>Herring gull</td> <td>Non-breeding periods (CS3)</td> <td>2.4</td> <td>0.3%</td> </tr> <tr> <td>Kittiwake</td> <td>Non-breeding periods (CS3)</td> <td>8.7</td> <td>0.8%</td> </tr> </tbody> </table>	Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate	Herring gull	Non-breeding periods (CS3)	2.4	0.3%	Kittiwake	Non-breeding periods (CS3)	8.7	0.8%			
Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate													
Herring gull	Non-breeding periods (CS3)	2.4	0.3%													
Kittiwake	Non-breeding periods (CS3)	8.7	0.8%													

SPA	In-combination Displacement			Cumulative Impact Assessment (CIA) (sum of three developments)
	Neart na Gaoithe	Inch Cape	Firth of Forth	
<b>Buchan Ness to Collieston Coast</b>				
<b>Guillemot</b>				
Attend-colony period	<0.1%	0.8%	1.5%	<2.4
Chicks-on-sea period	<0.1%	0.4%	0.7%	<1.2
Post-breeding period	0.8%	0.2%	0.3%	1.3%
Non-breeding period	0.1%	0.2%	0.7%	1.1%
<b>Herring gull</b>				
Breeding period	<0.1%	<0.1%	<0.1%	<0.3%
Non-breeding period	<0.1%	<0.1%	<0.1%	<0.3%
<b>Kittiwake</b>				
Breeding period	<0.1%	<0.1%	<0.1%	<0.3%
Post-breeding	0.3%	0.2%	0.4%	0.9%
Non-breeding period	<0.1%	<0.1%	0.5%	<0.7%
<b>In-Combination Effects</b>	<ul style="list-style-type: none"> <li>● Guillemot: Buchan Ness to Collieston Coast SPA is beyond the mean maximum foraging range for guillemot with respect to Neart na Gaoithe during the breeding season. The highest level of displacement is predicted to occur during the colony attendance period. During this period the combined effect of the three wind farm developments is predicted to result in a potential loss of up to 2.4% of the foraging resource capacity of the qualifying SPA guillemot population. The main prey items for guillemots (sandeels and sprats) are widespread and it is therefore predicted that a loss of foraging resource capacity of 2.4% will have little or no adverse effect on the qualifying SPA population due to the likelihood that this loss could be recouped by birds foraging in sea areas adjacent to these developments. Outwith the colony attendance period the combined displacement effect of the three wind farm developments is predicted to result in a potential loss of between 1.1% (winter period) and 1.3% (post-breeding period) of the foraging resource capacity of guillemots originating from the Buchan Ness and Collieston Coast SPA. This level of resource loss resulting from displacement is not predicted to adversely affect guillemots originating from the Buchan Ness and Collieston Coast SPA.</li> <li>● Herring gull: Buchan Ness to Collieston Coast SPA is beyond the mean maximum foraging range for herring gull with respect to Neart na Gaoithe during the breeding season. The potential loss of access to resources of up to 0.3% for herring gulls during any period is predicted not cause an adverse effect.</li> <li>● Kittiwake: Buchan Ness to Collieston Coast SPA is beyond the mean maximum foraging range for kittiwake with respect to Neart na Gaoithe during the breeding season. During the post-breeding period up to 1% of the Buchan Ness to Collieston Coast SPA are predicted to be potentially displaced by the three offshore wind farms. The loss of access to resources of up to 1% of the population during the non-breeding period is not predicted to cause an adverse effect on kittiwakes originating from this SPA.</li> </ul>			
	<b>In-combination – Barrier effect</b>			
	<ul style="list-style-type: none"> <li>● Guillemot: No in-combination barrier effect is predicted as Neart na Gaoithe is beyond mean maximum foraging range of guillemot from this SPA during the breeding season.</li> <li>● Herring gull: No in-combination barrier effect is predicted as Neart na Gaoithe is beyond mean maximum foraging range of herring gull from this SPA during the breeding season.</li> <li>● Kittiwake: No in-combination barrier effect is predicted as Neart na Gaoithe is beyond mean maximum foraging range of kittiwake from this SPA during the breeding season.</li> </ul>			
	<b>In-combination – Collision risk</b>			
<ul style="list-style-type: none"> <li>● Guillemot: The predicted number of impacts is very low due to very low risk of collision and no adverse in-combination effects are predicted.</li> <li>● Herring gull: No in-combination collision impacts are predicted during the breeding period as Neart na Gaoithe is beyond mean maximum foraging range of herring gull from this SPA. During the non-breeding period it is predicted that between 0.4 and 3.2 collisions may occur from Inch Cape, and 2.5 and 4.0 from Firth of Forth Round 3 Zone depending on turbine design scenarios. Annual baseline mortality for the qualifying SPA herring gull population is predicted to increase by 1.0 % during the non-breeding period, based on a 98.0% avoidance rate and the combined effect of collisions with the most adverse wind farm designs at each of the three proposed wind farm sites. The current population is described as being in unfavourable condition and the incremental cumulative in-combination impact may constrain any future potential for recovery.</li> <li>● Kittiwake: During the non-breeding season, collision risk modelling predicts between 0 and 19.4 kittiwakes may collide with the proposed Inch Cape Offshore Wind Farm and between 71.5 and 115.3 with the Firth of Forth Round 3 Zone. Neart na Gaoithe is beyond the mean maximum foraging range of kittiwakes from this SPA during the breeding season; therefore, no-in-combination effects are predicted during the breeding season. Annual baseline mortality for the qualifying SPA kittiwake population is predicted to increase by 7.8 % during the non-breeding period, based on a 98.0% avoidance rate and the combined effect of collisions with the most adverse wind farm designs at each of the three proposed wind farm sites. The current population is described as being in unfavourable condition and the incremental cumulative in-combination impact may constrain any future potential for recovery.</li> <li>● Fulmar: No mortalities are predicted from Neart na Gaoithe. There are no collision risk modelling results available for other proposed offshore wind farms but it is predicted that the risk of collision is very low. Fulmar is the only breeding species predicted to have potential for a cumulative in-combination impact with the proposed Beatrice Offshore Wind farm (BOWF). A total of 53 fulmar are predicted to collide with BOWF, of which 22 are during the breeding season.</li> </ul>				

<b>Conclusions</b>	<p>In the breeding season, the potential for any effects from the proposed development is effectively limited to fulmar and the estimated magnitude of all effects on this species is very small (equivalent to &lt;0.1% loss of foraging habitat) and unlikely to have any adverse effect on the population;</p> <p>In the non-breeding parts of the year fulmar, herring gull, kittiwake and guillemot from the Buchan Ness to Collieston Coast SPA breeding populations are likely to be present in the proposed wind farm footprint in small numbers and these birds could potentially be affected by disturbance and displacement. The small numbers of kittiwakes and herring gulls potentially present in the wind farm may also be subject to collision risk; and</p> <p>In all cases the potential magnitude of any adverse effects is estimated to be very small or small using cautious assumptions and therefore it is predicted that the conservation status of Buchan Ness to Collieston Coast SPA populations will not be affected by the proposed development either alone or in-combination with other plans or projects.</p>	
	Qualifying feature	Potential adverse effect
	<b>Seabird assemblage, breeding</b>	See below
	<b>Fulmar, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect
	<b>Shag, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect
	<b>Herring gull, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination effect
	<b>Kittiwake, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. Potential for in-combination collision impact that may inhibit future potential for recovery.
	<b>Guillemot, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect

**Box 1.9 Fowlsheugh SPA**

*Site Information*

Topic	Information																																																																		
<b>Qualifying features of site and possible connectivity</b>  SPA is 62 km north of Neart na Gaoithe	<table border="1"> <thead> <tr> <th>Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i>, 2012)</th> <th>Site total at designation</th> <th>Last assessed condition</th> <th>Possible connectivity in breeding period</th> <th>Possible connectivity in non-breeding period</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>Seabird assemblage, breeding</td> <td>145,000 i</td> <td>Favourable Maintained</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Fulmar, breeding * 400 km</td> <td>1,170 p</td> <td>Favourable Maintained</td> <td>Yes</td> <td>Yes</td> <td>Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.</td> </tr> <tr> <td>Herring gull, breeding * 61.1 km</td> <td>3,190 p</td> <td>Unfavourable Declining</td> <td>Yes</td> <td>Yes</td> <td>Offshore site only slightly beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.</td> </tr> <tr> <td>Kittiwake, breeding 60.0 km</td> <td>36,650 p</td> <td>Favourable Maintained</td> <td>Yes</td> <td>Yes</td> <td>Offshore site just within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.</td> </tr> <tr> <td>Guillemot, breeding 84.2 km</td> <td>56,450 i</td> <td>Favourable Maintained</td> <td>Yes</td> <td>Yes</td> <td>Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.</td> </tr> <tr> <td>Razorbill, breeding * 48.5 km</td> <td>5,800 i</td> <td>Favourable Maintained</td> <td>No</td> <td>Yes</td> <td>Offshore site beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site only in non-breeding periods.</td> </tr> </tbody> </table>	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason	Seabird assemblage, breeding	145,000 i	Favourable Maintained				Fulmar, breeding * 400 km	1,170 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.	Herring gull, breeding * 61.1 km	3,190 p	Unfavourable Declining	Yes	Yes	Offshore site only slightly beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.	Kittiwake, breeding 60.0 km	36,650 p	Favourable Maintained	Yes	Yes	Offshore site just within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.	Guillemot, breeding 84.2 km	56,450 i	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.	Razorbill, breeding * 48.5 km	5,800 i	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site only in non-breeding periods.																								
	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason																																																													
	Seabird assemblage, breeding	145,000 i	Favourable Maintained																																																																
	Fulmar, breeding * 400 km	1,170 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.																																																													
	Herring gull, breeding * 61.1 km	3,190 p	Unfavourable Declining	Yes	Yes	Offshore site only slightly beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.																																																													
	Kittiwake, breeding 60.0 km	36,650 p	Favourable Maintained	Yes	Yes	Offshore site just within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.																																																													
	Guillemot, breeding 84.2 km	56,450 i	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion potentially present in offshore site at all times of year.																																																													
Razorbill, breeding * 48.5 km	5,800 i	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site only in non-breeding periods.																																																														
*species qualifies as a seabird assemblage component only. i = individuals; p = pairs.  Data from the 2 years of baseline surveys indicate that all of the seabird species that are qualifying interests at Fowlsheugh SPA commonly occur in the proposed offshore site. Four qualifying species, fulmar, herring gull, kittiwake and guillemot have mean maximum foraging ranges during the breeding season that exceed or are very close to the distance between the SPA and the proposed offshore site; (62 km).  During the non-breeding part of the year it is possible that some individuals of all qualifying species will occur in the offshore site and could be affected. A summary of the potential connectivity of these species is provided below.																																																																			
<b>Importance of site for connected species</b>	The importance of the offshore site for foraging for qualifying species at Fowlsheugh SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2 (CS2), and using Connectivity Scenario 3 (CS3) for other periods of the year.  Tracking studies of kittiwakes breeding at Fowlsheugh in 2011 indicate that these birds are not likely to forage within the offshore site. Although the sample size for this study was small, the results suggest that the offshore site is of low importance kittiwakes from Fowlsheugh during the colony-attendance period. The closest individual was recorded foraging 8 km to the northeast of the offshore site on one occasion.  The results below show that the only qualifying populations at Fowlsheugh SPA that the offshore site and buffer is likely to have more than negligible importance for are guillemot during the colony-attendance and post-breeding periods and razorbill during the chicks-at-sea and post-breeding periods. The numbers of guillemots and razorbills present at other times of year and other species at all times of year are estimated to be below 0.5% of the SPA population.																																																																		
	<table border="1"> <thead> <tr> <th rowspan="2">Species/Qualifying feature</th> <th colspan="4">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td>Fulmar</td> <td>1.3%</td> <td>NA</td> <td>NA</td> <td>0.1%</td> <td>&lt;0.1%, (&lt;1)</td> <td>NA</td> <td>NA *</td> <td>&lt;0.1%, (&lt;1)</td> </tr> <tr> <td>Herring gull</td> <td>5.8%</td> <td>NA</td> <td>NA</td> <td>2.0%</td> <td>&lt;0.1%, (&lt;1)</td> <td>NA</td> <td>NA *</td> <td>0.1%, (&lt;5)</td> </tr> <tr> <td>Kittiwake</td> <td>31.2%</td> <td>NA</td> <td>31.9%</td> <td>16.0%</td> <td>0.5%, (107)</td> <td>NA</td> <td>1.2%, (399)</td> <td>&lt;0.1%, (18)</td> </tr> <tr> <td>Guillemot</td> <td>20.3%</td> <td>27.4%</td> <td>27.4%</td> <td>27.4%</td> <td>0.6%, (189)</td> <td>0.2%, (137)</td> <td>1.7%, (1,402)</td> <td>0.3%, (241)</td> </tr> <tr> <td>Razorbill</td> <td>None</td> <td>13.6%</td> <td>13.6%</td> <td>13.6%</td> <td>none</td> <td>0.7%, (49)</td> <td>3.9% (280)</td> <td>0.4%, (26)</td> </tr> </tbody> </table>						Species/Qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Fulmar	1.3%	NA	NA	0.1%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)	Herring gull	5.8%	NA	NA	2.0%	<0.1%, (<1)	NA	NA *	0.1%, (<5)	Kittiwake	31.2%	NA	31.9%	16.0%	0.5%, (107)	NA	1.2%, (399)	<0.1%, (18)	Guillemot	20.3%	27.4%	27.4%	27.4%	0.6%, (189)	0.2%, (137)	1.7%, (1,402)	0.3%, (241)	Razorbill	None	13.6%	13.6%	13.6%	none	0.7%, (49)	3.9% (280)
Species/Qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																																																														
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																																																											
Fulmar	1.3%	NA	NA	0.1%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)																																																											
Herring gull	5.8%	NA	NA	2.0%	<0.1%, (<1)	NA	NA *	0.1%, (<5)																																																											
Kittiwake	31.2%	NA	31.9%	16.0%	0.5%, (107)	NA	1.2%, (399)	<0.1%, (18)																																																											
Guillemot	20.3%	27.4%	27.4%	27.4%	0.6%, (189)	0.2%, (137)	1.7%, (1,402)	0.3%, (241)																																																											
Razorbill	None	13.6%	13.6%	13.6%	none	0.7%, (49)	3.9% (280)	0.4%, (26)																																																											
*The numbers in parentheses are the estimated number of individuals present rounded to the nearest whole number																																																																			

<b>Conservation objectives of site</b>	<p>The conservation objectives for Fowlsheugh SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>
--	---

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of likely significant effect																									
<b>Displacement and Disturbance</b>	<p>Based on information from existing studies, herring gull and kittiwake may experience up to 25% displacement, guillemot and razorbill up to 50% displacement and fulmar up to 100% displacement (there is limited evidence of displacement level, so a worst-case scenario is assumed), for example, the value of the wind farm footprint as foraging habitat for these species is reduced by up to these percentages.</p> <p>Given the very large areas of foraging habitat available and the large natural spatial and temporal variations in prey abundance, it is unlikely that losses of potential foraging resource of less than 1% would result in a discernible adverse effect on population and so such impacts are predicted as having no adverse effect.</p> <p>For all qualifying species, other than guillemot and razorbill, irrespective of the displacement rate, the offshore site is of very low value to the SPA population and, therefore, even if all individuals were displaced, the impact on the population is likely to be negligible. Therefore, there is predicted to be no adverse effect of displacement for fulmar, herring gull or kittiwake.</p> <p>For guillemot, if 50% of individuals were displaced from the offshore site and buffer, it is estimated to amount to an effective loss of 0.8% in the foraging resources used in the post-breeding periods. For razorbill, if 50% of individuals were displaced from the offshore site buffered to 1 km it is estimated to amount to an effective loss of 0.3% in the chicks-on-sea period and 2.0% in the post-breeding period.</p> <p>Guillemots and razorbill populations are likely to have low to moderate sensitivity to displacement at these times of year because this is when adults may be feeding large young and when they undergo wing moult and become flightless for several weeks.</p> <p>There is uncertainty as to what effect displacement may have on birds. However, it is predicted that displaced guillemots and razorbills will be able to forage elsewhere and that a relatively small proportion of the SPA population may be affected. Consequently, it is predicted that there will not be an adverse effect on guillemot or razorbill from displacement.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e91e63; color: white;">Qualifying feature</th> <th style="background-color: #e91e63; color: white;">Time of year (assumed connectivity scenario)</th> <th style="background-color: #e91e63; color: white;">% of SPA population in offshore site and buffer</th> <th style="background-color: #e91e63; color: white;">Assumed displacement rate</th> <th style="background-color: #e91e63; color: white;">Estimated % of at-sea population displaced</th> </tr> </thead> <tbody> <tr> <td><b>Guillemot</b></td> <td>Colony attendance (CS2)</td> <td>0.6%</td> <td>50%</td> <td>0.3%</td> </tr> <tr> <td><b>Guillemot</b></td> <td>Post breeding (CS3)</td> <td>1.7%</td> <td>50%</td> <td>0.8%</td> </tr> <tr> <td><b>Razorbill</b></td> <td>Chick-at-sea (CS3)</td> <td>0.7%</td> <td>50%</td> <td>0.3%</td> </tr> <tr> <td><b>Razorbill</b></td> <td>Post breeding (CS3)</td> <td>3.9%</td> <td>50%</td> <td>2.0%</td> </tr> </tbody> </table>	Qualifying feature	Time of year (assumed connectivity scenario)	% of SPA population in offshore site and buffer	Assumed displacement rate	Estimated % of at-sea population displaced	<b>Guillemot</b>	Colony attendance (CS2)	0.6%	50%	0.3%	<b>Guillemot</b>	Post breeding (CS3)	1.7%	50%	0.8%	<b>Razorbill</b>	Chick-at-sea (CS3)	0.7%	50%	0.3%	<b>Razorbill</b>	Post breeding (CS3)	3.9%	50%	2.0%
Qualifying feature	Time of year (assumed connectivity scenario)	% of SPA population in offshore site and buffer	Assumed displacement rate	Estimated % of at-sea population displaced																						
<b>Guillemot</b>	Colony attendance (CS2)	0.6%	50%	0.3%																						
<b>Guillemot</b>	Post breeding (CS3)	1.7%	50%	0.8%																						
<b>Razorbill</b>	Chick-at-sea (CS3)	0.7%	50%	0.3%																						
<b>Razorbill</b>	Post breeding (CS3)	3.9%	50%	2.0%																						
<b>Barrier Effect</b>	<p>The large distance (61 km) between the SPA and the offshore site and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season mean that it is not likely that the Development could present a significant barrier effect to foraging birds from the Fowlsheugh SPA.</p>																									
<b>Collision Mortality</b>	<p>The number of collision deaths of a species that are likely to be attributable to the Fowlsheugh SPA population can be estimated by multiplying the total number of deaths estimated by CRM for that period of the year by the assumed connectivity.</p> <p>The only qualifying species populations that could potentially be adversely affected by collision mortality are herring gull and kittiwake. For all other qualifying species, the proportion of flight activity recorded during baseline surveys at rotor height was either zero or negligible and therefore no appreciable mortality was predicted by CRM.</p> <p>Connectivity Scenario 2 was used to estimate the proportion of annual collision risk mortality during the breeding period.</p> <ul style="list-style-type: none"> <li>● Herring gull: The results from the modelling predict one collision per year arising from the proposed development, which is predicted not to cause an adverse effect. During the non-breeding period an additional 1.4 herring gulls are predicted to collide.</li> <li>● Kittiwake: Collision risk modelling predicts up to 18 collisions during each breeding season may involve birds from Fowlsheugh SPA. This may increase the baseline mortality rate by 1.3%. The additional increase is relatively small and the population is in favourable condition, therefore it is not predicted to cause an adverse effect. During the non-breeding period an additional 11 kittiwakes collisions are predicted to occur, increasing the baseline mortality rate by 0.8%.</li> <li>● Herring gull: Up to 1.0 herring gull collision during each breeding season is predicted to involve birds from Fowlsheugh SPA, with up to an additional 1.4 collisions predicted during each non-breeding period. Therefore less than two herring gulls per year are predicted to collide with Neart na Gaoithe. The herring gull population is not in favourable condition and any additional increase in mortality may facilitate the decline. However, the low number of predicted collisions is not predicted to significantly increase this decline.</li> </ul>																									

Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate	
Herring gull	Breeding (CS2)	1.1	0.2%	
Herring gull	Non-breeding periods (CS3)	1.4	0.3%	
Kittiwake	Breeding (CS2)	17.7	1.3%	
Kittiwake	Non-breeding periods (CS3)	10.7	0.8%	

In-combination Displacement				
SPA	Neart na Gaoithe	Inch Cape	Firth of Forth	CIA (sum of three developments)
<b>Fowlsheugh</b>				
<b>Guillemot</b>				
Attend-colony period	0.3%	2.0%	4.2%	6.5%
Chicks-on-sea period	<0.1%	0.4%	0.7%	<1.2%
Post-breeding period	0.8%	0.2%	0.3%	1.3%
Non-breeding period	0.1%	0.2%	0.7%	1.0%
<b>Herring gull</b>				
Breeding period	<0.1%	<0.1%	0.1%	<0.3%
Non-breeding period	<0.1%	<0.1%	<0.1%	<0.3%
<b>Kittiwake</b>				
Breeding period	0.1%	1.1%	1.7%	2.9%
Post-breeding	0.3%	0.2%	0.4%	0.9%
Non-breeding period	<0.1%	<0.1%	0.5%	<0.7%
<b>Razorbill</b>				
Chicks-on-sea period	0.3%	2.4%	4.7%	7.4%
Post-breeding period	2.0%	1.4%	3.2%	6.6%
Non-breeding period	0.2%	0.4%	1.0%	1.6%

**In-Combination Effects**

- Guillemot: The highest level of displacement is predicted to occur during the colony attendance period. During this period the combined effect of the three proposed developments is predicted to result in a potential loss of up to 6.5% of the foraging resource capacity of the qualifying SPA guillemot population. The main prey items for guillemots (sandeels and sprats) are widespread and it is therefore predicted that a loss of foraging resource capacity of 6.5% will have little or no adverse effect on the qualifying SPA population due to the likelihood that this loss could be recouped by birds foraging in sea areas adjacent to these developments.. Outside the colony attendance period the combined displacement effect of the three wind farm developments is predicted to result in a potential loss of between 1.0% (non-breeding period) and 1.3% (post-breeding period) of the foraging resource capacity of guillemots originating from the Fowlsheugh SPA. This level of resource loss resulting from displacement is not predicted to adversely affect the SPA guillemot population.
- Herring gull: Fowlsheugh SPA is within the mean maximum foraging range for herring gull with respect to Neart na Gaoithe during the breeding season. During the breeding and non-breeding periods the combined displacement effect of the three proposed developments is predicted to result in a potential loss of up to 0.3% of the foraging resource capacity of the Fowlsheugh SPA herring gull population. It is predicted that a loss due to displacement of 0.3% will not have an adverse effect on the SPA qualifying population.
- Kittiwake: Fowlsheugh SPA is within the mean maximum foraging range for kittiwake with respect to all three proposed developments. The highest level of displacement is predicted to occur during the breeding period. During this period the combined effect of the three proposed developments is predicted to result in a potential loss of up to 2.9% of the foraging resource capacity of the qualifying SPA kittiwake population. Kittiwakes are highly mobile and will be able to locate suitable foraging areas outside the area of displacement and it is therefore predicted that a reduced foraging resource capacity of 2.9% will not have an adverse effect on the qualifying Fowlsheugh SPA kittiwake population. Outside the breeding period the potential loss of resources is lower, at 1% or less and birds will be more mobile than during the breeding period. Therefore, it is predicted that there will not be an adverse effect on kittiwakes in the post-breeding and non-breeding periods.
- Razorbill: Fowlsheugh SPA is beyond the mean maximum foraging range for the proposed developments and therefore no impacts from displacement are predicted to occur during the breeding period. Following breeding when adults with chicks are on the sea, there is a greater risk for displacement effect. The displacement assessment predicts the highest loss of resources to razorbills immediately after breeding with foraging resource capacity of the SPA population reduced by up to 7.4% during this period. The key prey items for razorbills (sandeels) are widespread and it is therefore predicted that a loss of foraging resource capacity of 7.4% will have little or no adverse effect on the qualifying SPA population due to the likelihood that this loss could be recouped by birds foraging in sea areas adjacent to these developments.

**In-combination – Barrier effect**

- Guillemot: There is predicted to be a potential increase in flight length from the proposed Inch Cape Offshore Wind Farm of 5% and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm. The potential for an in-combination increase in barrier effects from Fowlsheugh SPA is predicted to be low and any incremental increase in flight duration will be small. Therefore no in-combination adverse effects are predicted.
- Herring gull: Barrier effects on herring gulls have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there might be an increase in flight length from the proposed Inch Cape Offshore Wind farm of 6% for less than 5% of the flights but no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.
- Kittiwake: Barrier effects on kittiwakes have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there may be an increase in flight length from the proposed Inch Cape Offshore Wind Farm of 6% for 5% of the flights but no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.
- Razorbill: Fowlsheugh SPA is beyond the mean maximum foraging range for the proposed developments and therefore no barrier effects will occur.

**In-combination – Collision risk**

- Guillemot: Predicted number of impacts are very low due to very low risk of collision and no adverse in-combination affects predicted.
- Herring gull: During the breeding period it is predicted that between 1.3 and 10.6 collisions may occur from Inch Cape and between 2.5 and 3.9 from the Firth of Forth Round 3 Zone depending on turbine design scenarios. During the non-breeding period the predicted number of collisions from Inch Cape is predicted to be that between 0.4 and 3.2 collisions may occur from Inch Cape and between 1.5 and 2.4 from the Firth of Forth Round 3 Zone. Annual baseline mortality for the qualifying SPA herring gull population is predicted to increase by 3.1 % during one year, based on a 98.0% avoidance rate and the combined effect of collisions with the most adverse wind farm designs at each of the three proposed wind farm sites. The current population is described as being in unfavourable condition and declining and the incremental cumulative in-combination impact may constrain any future potential for recovery.
- Kittiwake: During the breeding period, collision risk modelling predicts that between 3 and 326 kittiwakes may collide with the proposed Inch Cape Offshore Wind Farm and between 215 and 348 with the Firth of Forth Round 3 Zone, depending on the design scenario. Outside the breeding period the number of collisions predicted at Inch Cape is between 0 and 24 and for the Firth of Forth Round 3 Zone between 87 and 142. Annual baseline mortality for the qualifying SPA kittiwake population is predicted to increase by 26.2 % during one year, based on a 98.0% avoidance rate and the combined effect of collisions with the most adverse wind farm designs at each of the three proposed wind farm sites. The current population is described as being in unfavourable condition and the incremental cumulative in-combination impact may constrain any future potential for recovery.

The only qualifying species from Fowlsheugh predicted to potentially have an in-combination impact with the proposed Beatrice Offshore Wind Farm is fulmar that has an extensive foraging range. The Beatrice Offshore Wind Farm predicts a total of 53 fulmar collisions per year, of which 22 may be during the breeding season.

**Conclusions**

Qualifying feature	Potential adverse effect
Seabird assemblage	See below.
Fulmar	No displacement or disturbance impacts predicted and very low risk of collision mortality. No adverse effect. No predicted in-combination adverse effect.
Herring gull	No displacement or disturbance impacts predicted. Less than 1% reduction in baseline mortality from potential collisions. Population is in unfavourable condition but small potential increase in mortality unlikely to cause a significant effect. No adverse effect. No predicted in-combination adverse effect.
Kittiwake	No displacement or disturbance impacts predicted. Predicted mortality rate is lower than 1% increase in baseline mortality during the non-breeding season. The SPA population is in favourable condition and the relatively small increase in possible mortality is not predicted to cause an adverse effect. No adverse effect. Potential for in-combination effect.
Guillemot	Potential for an estimated displacement of up to ca. 0.8% of population during post-breeding period. Displaced birds will be able to relocate elsewhere and increases in mortality due to displacement in the post-breeding period are not predicted to occur. No adverse effect. No predicted in-combination adverse effect.
Razorbill	Potential for an estimated displacement of up to ca. 0.3% and ca. 2.0% of population during chicks-at-sea and post-breeding periods respectively. Displaced birds will be able to relocate elsewhere and increases in mortality due to displacement following breeding are not predicted to occur. No adverse effect. No predicted in-combination adverse effect

**Box 1.10 Forth Islands SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 16 km southwest of Neart na Gaoithe	Seabird assemblage, breeding	90,000 i	Unfavourable Declining			
	Fulmar, breeding * 400 km	798 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
	Gannet, breeding 229.4 km	21,600 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
	Cormorant, breeding * 25 km	200 p	Favourable Declining	No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys.
	Shag, breeding 14.5 km	2,400 p	Unfavourable Recovering	No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys
	Lesser black-backed gull, breeding 141 km	1,500 p	Favourable Maintained	Yes	No	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site during breeding season. Only recorded in very low numbers occasionally in offshore site in non-breeding period.
	Herring gull, breeding * 61.1 km	6,600 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
	Kittiwake, breeding * 60.0 km	8,400 p	Unfavourable Declining	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
	Sandwich tern, breeding 49.0 km	440 p	Unfavourable Declining	No	No	Not recorded in offshore site on baseline surveys.
	Roseate tern, breeding 16.6 km	8 p	Unfavourable Declining	No	No	Not recorded in offshore site on baseline surveys.
	Common tern, breeding 15.2 km	334 p	Favourable Maintained	No	No	Rarely present in offshore site during breeding season, Occasionally present in low numbers in offshore site in autumn passage period.
	Arctic tern, breeding 24.2 km	540 p	Favourable Declining	No	Yes	Rarely present in offshore site during breeding season of SPA. Occasionally present in large numbers in offshore site in autumn passage period.
	Guillemot, breeding * 84.2 km	16,000 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
	Razorbill, breeding * 48.5 km	1,400 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.
Puffin, breeding 105.4 km	14,000 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Potentially present in offshore site at all times of year.	

Topic	Information																																																																																																		
	<p>*species qualifies as a seabird assemblage component only. i = individuals; p = pairs.</p> <p>Data from the 2 years of baseline surveys indicate that some of the qualifying species at the Forth Islands SPA do not use the offshore site, or use it so rarely that they are not predicted to be affected. These species are cormorant, shag, roseate tern, Sandwich tern and common tern.</p> <p>Parts of the wind farm infrastructure may potentially provide perches for cormorant and shag and so attract them to use the offshore site in the future. Were this to happen, it is not predicted that it would lead to a significant collision risk because these species are not considered at high risk of collision impacts. Therefore, any attraction into the proposed wind farm would result in a positive or neutral effect on the SPA population of these species. Therefore these two species are not considered further.</p> <p>The proposed wind farm is within the mean foraging range of all the other qualifying species and all these species were commonly recorded during baseline surveys.</p>																																																																																																		
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging birds from qualifying populations at the Forth Islands SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 1, and using Connectivity Scenario 3 in for other periods of the year.</p> <p>The Forth Islands SPA is the closest breeding seabird SPA to the proposed wind farm. For this reason, Connectivity Scenario 1 is assumed for the colony-attendance part of the year for assessment purposes, i and so it is assumed that all individuals using the offshore site at this time are from colonies in the Forth Islands SPA.</p> <p>Connectivity Scenario 2 is assumed for the chick-on sea period for guillemot and razorbill as this leads to more cautious assumptions than Connectivity Scenario 3. However, there is evidence of a large influx of razorbills (but not guillemot) from other regions into the Firth of Forth area during July and August and therefore Connectivity Scenario 3 (10.1%) is arguably more appropriate for razorbill than Connectivity Scenario 2 (67.1%).</p> <p>Tracking data for gannet, kittiwake, razorbill and guillemot indicate that the vast majority of individuals using the offshore site in the colony-attendance part of the breeding season are likely to be from the Forth Islands SPA colonies. Consideration of mean foraging distance and the distance to other possible breeding sites suggests that Connectivity Scenario 1 is also likely to be the most appropriate for herring gull, lesser black-backed gull and puffin during the breeding season. On the same basis it is likely that some fulmars, a species with a large foraging range, using the offshore site in the breeding season may originate from other colonies and that CS2 (8.6%) would be more appropriate for this species. However, in keeping with a cautious approach to assessment it is nevertheless assumed that all fulmars using the offshore site in the breeding season are from the Forth Islands SPA.</p> <p>There are two gannet colonies in the region, Troup Head and the Bass Rock, which is a component of the Forth Islands SPA. For the purpose of assessment it is assumed that all adult gannets present in the breeding season were breeding at the Forth Islands SPA.</p> <p>For all species except gannet, the potential effects of the proposed development on the Forth Islands SPA qualifying species populations during the non-breeding period of the year are assessed assuming that the degree of connectivity estimated by Connectivity Scenario 3.</p> <p>For Arctic tern, Connectivity Scenario 3 is also used, but breeding colonies as far north as Shetland are taken into account rather than just those in the defined breeding region used for other species (Peterhead to Blyth). The large numbers of Arctic terns encountered on occasion on baseline surveys in the autumn passage period strongly suggest that birds from beyond the region are migrating south through the area. The origins of the birds present at this time of year are not known but are likely to include other Scottish breeding sites to the north, and possibly Scandinavia. Therefore, the assessment of Arctic tern for the autumn passage period is based on comparison against the breeding population for Shetland to Northumberland which is of 98,052 adults, (derived from Mitchell <i>et al.</i>, 2004, see Chapter 12: Ornithology).</p> <p>The offshore site (with 1 km buffer) is likely to have more than negligible importance for six of the qualifying species populations of the SPA as more than 1% of the at-sea population is likely to be present at certain times of year. These species are fulmar, gannet, kittiwake, guillemot, razorbill, and puffin.</p> <p>Connectivity Scenario 1 is likely to significantly overestimate the estimated importance of the offshore site for fulmar during the colony-attendance period. However, CS2 predicts that only 0.36% of the SPA population is on average present in this period, which is almost certainly an underestimate. The true figure is likely to be between the two values.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="background-color: #800040; color: white;">Species/qualifying feature</th> <th colspan="4" style="background-color: #800040; color: white;">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4" style="background-color: #800040; color: white;">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS2)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td><b>Fulmar</b></td> <td>100%</td> <td>NA</td> <td>NA</td> <td>0.27%</td> <td>1.5%, (27)</td> <td>NA</td> <td>NA</td> <td>&lt;0.1%, (&lt;1)</td> </tr> <tr> <td><b>Gannet</b></td> <td>100%</td> <td>NA</td> <td></td> <td>50% (CS3)</td> <td>1.4%, (870)</td> <td>NA</td> <td>NA</td> <td>0.1%, (78)</td> </tr> <tr> <td><b>Herring gull</b></td> <td>100%</td> <td>NA</td> <td>NA</td> <td>4.5%</td> <td>0.2%, (10)</td> <td>NA</td> <td>NA</td> <td>0.1%, (12)</td> </tr> <tr> <td><b>Lesser black-backed gull</b></td> <td>100%</td> <td>NA</td> <td>NA</td> <td>None</td> <td>0.6%, (17)</td> <td>NA</td> <td>NA</td> <td>None</td> </tr> <tr> <td><b>Kittiwake</b></td> <td>100%</td> <td>NA</td> <td>7.8% (CS3a)</td> <td>3.9% (CS3b)</td> <td>6.4%, (342)</td> <td>NA</td> <td>1.2%, (98)</td> <td>&lt;0.1%, (45)</td> </tr> <tr> <td><b>Arctic tern</b></td> <td>Almost none (CS3)</td> <td>NA</td> <td>1.9%</td> <td>None</td> <td>None</td> <td>NA</td> <td>0.4%, (8)</td> <td>None</td> </tr> <tr> <td><b>Guillemot</b></td> <td>100%</td> <td>30.3%</td> <td>10.5%</td> <td>10.5%</td> <td>7.2%, (930)</td> <td>0.5%, (151)</td> <td>1.7%, (538)</td> <td>0.3%, (92)</td> </tr> <tr> <td><b>Razorbill</b></td> <td>100%</td> <td>67.1%</td> <td>10.1%</td> <td>10.1%</td> <td>6.7%, (124)</td> <td>0.66%, (241)</td> <td>3.9%, (207)</td> <td>0.4%, (19)</td> </tr> <tr> <td><b>Puffin</b></td> <td>100%</td> <td>NA</td> <td>47.0%</td> <td>47.0%</td> <td>2.1%, (1,877)</td> <td>NA</td> <td>0.5%, (643)</td> <td>&lt;0.1%, (16)</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest whole number.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS2)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	<b>Fulmar</b>	100%	NA	NA	0.27%	1.5%, (27)	NA	NA	<0.1%, (<1)	<b>Gannet</b>	100%	NA		50% (CS3)	1.4%, (870)	NA	NA	0.1%, (78)	<b>Herring gull</b>	100%	NA	NA	4.5%	0.2%, (10)	NA	NA	0.1%, (12)	<b>Lesser black-backed gull</b>	100%	NA	NA	None	0.6%, (17)	NA	NA	None	<b>Kittiwake</b>	100%	NA	7.8% (CS3a)	3.9% (CS3b)	6.4%, (342)	NA	1.2%, (98)	<0.1%, (45)	<b>Arctic tern</b>	Almost none (CS3)	NA	1.9%	None	None	NA	0.4%, (8)	None	<b>Guillemot</b>	100%	30.3%	10.5%	10.5%	7.2%, (930)	0.5%, (151)	1.7%, (538)	0.3%, (92)	<b>Razorbill</b>	100%	67.1%	10.1%	10.1%	6.7%, (124)	0.66%, (241)	3.9%, (207)	0.4%, (19)	<b>Puffin</b>	100%	NA	47.0%	47.0%	2.1%, (1,877)	NA	0.5%, (643)	<0.1%, (16)
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																																																																																														
	Colony-attendance period (CS2)	Chicks-at-sea period (CS2)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																																																																																											
<b>Fulmar</b>	100%	NA	NA	0.27%	1.5%, (27)	NA	NA	<0.1%, (<1)																																																																																											
<b>Gannet</b>	100%	NA		50% (CS3)	1.4%, (870)	NA	NA	0.1%, (78)																																																																																											
<b>Herring gull</b>	100%	NA	NA	4.5%	0.2%, (10)	NA	NA	0.1%, (12)																																																																																											
<b>Lesser black-backed gull</b>	100%	NA	NA	None	0.6%, (17)	NA	NA	None																																																																																											
<b>Kittiwake</b>	100%	NA	7.8% (CS3a)	3.9% (CS3b)	6.4%, (342)	NA	1.2%, (98)	<0.1%, (45)																																																																																											
<b>Arctic tern</b>	Almost none (CS3)	NA	1.9%	None	None	NA	0.4%, (8)	None																																																																																											
<b>Guillemot</b>	100%	30.3%	10.5%	10.5%	7.2%, (930)	0.5%, (151)	1.7%, (538)	0.3%, (92)																																																																																											
<b>Razorbill</b>	100%	67.1%	10.1%	10.1%	6.7%, (124)	0.66%, (241)	3.9%, (207)	0.4%, (19)																																																																																											
<b>Puffin</b>	100%	NA	47.0%	47.0%	2.1%, (1,877)	NA	0.5%, (643)	<0.1%, (16)																																																																																											

Topic	Information
Conservation objectives of site	<p>The conservation objectives for Forth Islands SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>

**Potential Adverse Effects**

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	<p>Based on information from existing studies, herring gull and kittiwake may experience up to 25% displacement, guillemot up to 50% displacement and fulmar and gannet up to 100% displacement. There is limited evidence of displacement level and so a worst-case is assumed.</p> <p>During the colony attendance period the proposed offshore site is of relatively high value for kittiwake, guillemot, razorbill and fulmar and to a lesser extent puffin.</p> <p>For all qualifying species other than guillemot and razorbill, irrespective of the displacement rate, the offshore site is of very low value to the SPA population and, therefore, even if all individuals were displaced the impact on the population is likely to be negligible. Therefore there is predicted to be no adverse effect of displacement for fulmar, gannet, lesser black-backed gull, herring gull, kittiwake, Arctic tern or puffin.</p> <p>The scale of magnitude of the potential effects arising from displacement of guillemot and razorbill during the breeding and post-breeding periods is sufficient to give cause for concern regarding potential adverse effects on the Favourable Conservation Status of the guillemot and razorbill populations breeding at this SPA. The impacts of displacement, should it occur, are uncertain. However, it is not predicted that individuals displaced will die or that the displacement will cause any significant increase in mortality. The distribution of the guillemots and razorbills in the Forth and Tay area is widespread which indicates that displaced birds will be able to relocate to other areas without significant adverse effects.</p>
Barrier Effect	<p><b>Fulmar</b></p> <p>The combination of very low use by fulmars of the offshore site during the breeding season and the low sensitivity of this species to displacement effects mean that it is not predicted that the wind farm could act as a significant barrier to this species. Therefore, barrier effects are not considered further.</p> <p><b>Gannet</b></p> <p>Evidence from the Netherlands indicates that gannets are displaced from operational wind farms. It is therefore likely that gannets are susceptible to barrier effects.</p> <p>The proposed development could form a barrier of 17.8 km wide 27 km northeast of the Bass Rock. This barrier would potentially block approximately 27% of the possible flight directions available to gannets flying out to distances in excess of 27 km from the colony. It is possible that gannets preferentially select the directions affected by a barrier above the other directions available.</p> <p>The potential effect the barrier could have on flight distances and times depends on how far on average the destination areas lie behind the barrier. Tagging studies of Bass Rock gannets show that they forage over a vast area of the northern North Sea, commonly travelling distances in excess of 100 km, and sometimes up to three times this distance. Therefore, it is reasonable to assume that likely destinations of gannet flights affected by the barrier would be at a wide range of distances beyond the offshore site, and commonly many tens of kilometres beyond.</p> <p>The mean destination distance of gannet foraging flights is 93 km (Thaxter <i>et al.</i>, 2012). Acknowledging that there is uncertainty in how far on average the destination distance of affected flights are from the colony, for the purpose of assessment a cautious value of 90 km is assumed. This would mean that the flight routes of birds affected by a barrier effect would be increased by approximately 2.2%.</p> <p>Studies on foraging gannets have shown that they are capable of extending foraging distances in response to distribution of prey. This suggests that the species would easily absorb the minor increases in flight distances that a barrier could cause.</p> <p><b>Lesser black-backed gull, herring gull and kittiwake</b></p> <p>The proposed development could form a barrier 17.9 km wide and located 16.2 km to the northeast. This barrier would potentially block approximately 33% of the possible flight directions available to gulls flying out to distances in excess of 16 km from the Isle of May. Assuming the destinations of affected flights are on average 10 km behind the proposed wind farm, the mean increase in the length of barrier-affected flights is estimated at 6.7%. On this basis, the overall barrier effect on the Isle of May colony is cautiously estimated to increase the average foraging distance by approximately 1.6% (Table Bar 3). This assumes that all potentially affected flights are affected, which on account of the low sensitivity of these species is unlikely. Assuming that &lt;50% of birds potentially affected choose to detour around the wind farm, the overall effect would reduce to &lt;1%. Lesser black-backed gulls, herring gull and kittiwake are considered to have low sensitivity to barrier effects on account of a low wing loading. This assumes that all potentially affected flights are affected, which on account of the low sensitivity of this species is unlikely. Assuming that 50% of birds potentially affected choose to detour around the wind farm the overall effect would reduce to approximately 0.8%.</p> <p><b>Razorbill</b></p> <p>For razorbill at the Isle of May colony, the proposed wind farm could present a barrier 17.9 km wide, 16.2 km to the northeast. This barrier could potentially block approximately 33% of the possible flight directions available to razorbills flying out to distances in excess of 16 km from the Isle of May. Assuming the destinations of affected flights are on average immediately behind (0 km) the proposed wind farm, the mean increase in the length of affected flights is estimated at 28.4%. On this basis, the overall barrier effect on the Isle of May colony is cautiously estimated to increase the all-flights average foraging distance by approximately 3.8%.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect																						
	<p><b>Guillemot and puffin</b></p> <p>For guillemot and puffins breeding at the Isle of May colony, the proposed wind farm could present a barrier 17.9 km wide, 16.2 km to the northeast. This barrier would potentially block approximately 33% of the possible flight directions available to puffins flying out to distances in excess of 16.2 km from the Isle of May. Assuming the destinations of affected flights are on average 10 km behind the proposed wind farm for guillemot and 20 km for puffin, the mean increase in the length of affected flights is estimated at 12.6% for guillemot and 8.1% for puffin. On this basis, the overall barrier effect on the Isle of May colony is cautiously estimated to increase the all-flights average foraging distance by approximately 1.8%.</p> <p>For guillemots and puffins breeding at the Craigleith colony the proposed wind farm could present a barrier 17.8 km wide 31.5 km to the northeast. This barrier would potentially block approximately 28% of the possible flight directions available to puffins flying out to distances in excess of 31.5 km from the Craigleith colony. Assuming the destinations of affected flights are on average immediately behind (0 km) the proposed wind farm for guillemot and 10 km for puffin, the mean increase in the length of affected flights is estimated at 12.1% for guillemot and 6.4% for puffin. On this basis, the overall barrier effect on the Craigleith colony is cautiously estimated to increase the all-flights average foraging distance by approximately 0.2%.</p>																						
Collision Mortality	<p>The number of collision deaths of a species that are likely to be attributable to the Forth Islands SPA population can be estimated by multiplying the total number of deaths estimated by CRM for that period of the year by the assumed connectivity.</p> <p>The only qualifying species populations that could plausibly be adverse affected by collision mortality are gannet, herring gull, lesser black-backed gull and kittiwake. For all other qualifying species, the proportion of flight activity recorded during baseline surveys at rotor height was either zero or negligible and therefore no appreciable mortality was predicted by CRM.</p> <p><b>Gannet</b></p> <p>The worst-case CRM modelling estimated that the average number of adult gannets killed annually would be 955 using an avoidance rate of 98.0%, and 239 using an avoidance rate of 99.5%. The latter avoidance rate is considered likely to be a more realistic estimate of the true avoidance rate based on published results from constructed offshore wind farms.</p> <p>These predictions assume that the amount and height of flight activity within the wind farm envelope during the operational phase will be the same as recorded during baseline surveys. However, this is not likely to be the case as studies at operational wind farms show that gannet exhibit a very high degree of far field displacement and far-field displacement is not included in the SNH default avoidance rate. Based on a study in the Netherlands (Leopold et al., 2011), far field displacement behaviour is likely to exceed 90% and any birds that do enter the wind farm at rotor height are likely to reduce quickly their altitude to well below rotor height. If these behavioural responses are taken into consideration the likely mortality caused by collisions may be at least ten times lower than the currently predicted levels of mortality.</p> <p>The baseline annual average mortality of adult birds in the Forth Islands breeding population is estimated at 9,321 birds based on an adult annual mortality rate of 8.40%. Therefore, additional loss of 955 adults each year based on 98% avoidance would represent an increase in baseline mortality rate of 9.8%. The additional loss of 238 birds each year based on 99.5% avoidance would represent an increase in mortality of 2.4%. For the reasons described above, it is likely that the actual collision mortality may be at least ten times lower than these values due to far-field displacement. It is concluded that the change in adult mortality rate of gannets is likely to be lower than &lt;1.0% (98%) and may be &lt;0.25% (99.5% AR). Given that the Bass Rock gannet population has shown a long term increasing trend by on average 2.9% per year, it is predicted that collision mortality from the proposed wind farm may not adversely affect the Favourable Conservation Status of this species.</p> <p><b>Herring gull</b></p> <p>Herring gulls are not expected to show any appreciable far field displacement behaviour from the proposed wind farm. Using a 98% avoidance rate between 8.9 and 13.4 collisions per year may occur, there will be an increase in baseline mortality rate of between 0.8 and 1.3. A 99.5% avoidance rate predicts a change of approximately 0.2% to 0.3%, which may be a more realistic estimate. The Forth Islands SPA herring gull population is undergoing a slow long term decline averaging approximately 0.7% decrease per year, over the past decade (SMP 2012) and is therefore likely to be relatively sensitive to additional mortality.</p> <p><b>Kittiwake</b></p> <p>Using a 98% avoidance rate and based on worst-case of 128 3.6MW turbines, CRM predicts that during the breeding season, between 38 and 56.8 kittiwakes may collide based on all predicted collisions to be from this one SPA, and between 1.8 and 2.6 during the non-breeding period. Together, this gives an annual total of 39.8 and 59.4 birds per year. If not all the collisions during the breeding season are from this SPA then the annual total reduces to between 13 and 19.5 birds per year. Based on a worst-case scenario, the baseline adult mortality rate of Forth Island SPA kittiwake population would increase by 17.4%. A 99.5% avoidance rate predicts a change of approximately 4.3%, which may be a more realistic estimate. The Forth Islands SPA kittiwake population is undergoing long-term decline averaging approximately 3.0% per year over the past decade (SMP 2012). It is therefore likely to be sensitive to additional mortality.</p> <p><b>Lesser black-backed gull</b></p> <p>Collision risk modelling predicts up to 5.8 Lesser black-backed gulls per year might collide with the proposed wind farm. This would increase the baseline mortality rate by 0.1%. The population is currently in favourable status and therefore a very small increase in baseline mortality of 0.1% is predicted not to cause an adverse effect.</p> <table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Time of year (assumed connectivity scenario)</th> <th>Estimated deaths per year for 98% avoidance rate</th> <th>% change in baseline mortality rate</th> </tr> </thead> <tbody> <tr> <td rowspan="3"><b>Gannet</b></td> <td>Breeding period (CS1)</td> <td>901.9</td> <td>9.2%</td> </tr> <tr> <td>Non-breeding period (CS3)</td> <td>50.5</td> <td>0.5%</td> </tr> <tr> <td>Whole year (CS1/CS3)</td> <td>952.4</td> <td>10.2%</td> </tr> <tr> <td><b>Lesser black-backed gull</b></td> <td>Breeding period (CS1)</td> <td>5.8</td> <td>0.1%</td> </tr> <tr> <td><b>Herring gull</b></td> <td>Breeding period (CS1)</td> <td>18.1</td> <td>1.7%</td> </tr> </tbody> </table>	Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate	<b>Gannet</b>	Breeding period (CS1)	901.9	9.2%	Non-breeding period (CS3)	50.5	0.5%	Whole year (CS1/CS3)	952.4	10.2%	<b>Lesser black-backed gull</b>	Breeding period (CS1)	5.8	0.1%	<b>Herring gull</b>	Breeding period (CS1)	18.1	1.7%
Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate																				
<b>Gannet</b>	Breeding period (CS1)	901.9	9.2%																				
	Non-breeding period (CS3)	50.5	0.5%																				
	Whole year (CS1/CS3)	952.4	10.2%																				
<b>Lesser black-backed gull</b>	Breeding period (CS1)	5.8	0.1%																				
<b>Herring gull</b>	Breeding period (CS1)	18.1	1.7%																				

Effect arising from project	Predicted impact and assessment of likely significant effect				
		Non-breeding period (CS3)	3.7	0.36%	
		Whole year (CS1/CS3)	21.6	2.1%	
	<b>Kittiwake</b>	Breeding period (CS1)	56.8	16.6%	
		Non-breeding periods (CS3)	2.6	0.80%	
		Whole year (CS1/CS3)	59.4	17.4%	
<b>In-Combination Effects</b>	<b>In-combination Displacement</b>				
	<b>SPA</b>	<b>Neart na Gaoithe</b>	<b>Inch Cape</b>	<b>Firth of Forth</b>	<b>CIA (sum of three developments)</b>
	<b>Forth Islands</b>				
	<b>Arctic tern</b>				
	Autumn passage	0.3%	0.2%	2.6%	3.1%
	<b>Gannet</b>				
	Non-breeding period	<0.1%	<0.1%	0.4%	<0.6%
	Breeding period, Scenario 1	1.4%	1.5%	5.4%	8.3%
	<b>Guillemot</b>				
	Chicks-on-sea period	<0.1%	0.4%	0.7%	<1.2%
	Post-breeding period	0.8%	0.2%	0.3%	1.3%
	Non-breeding period	0.1%	0.2%	0.7%	1.1%
	Attend-colony period, Scenario 1	3.6%	13.3%	34.6%	51.5%
	Attend-colony period, Scenario 2	1.1%	2.0%	4.3%	7.5%
	<b>Herring gull</b>				
	Non-breeding period	<0.1%	<0.1%	<0.1%	<0.3%
	Attend-colony period, Scenario 1	<0.1%	0.2%	0.5%	<0.8%
	Attend-colony period, Scenario 2	<0.1%	<0.1%	0.1%	<0.3%
	<b>Kittiwake</b>				
	Post-breeding	0.3%	0.2%	0.4%	1.0%
	Non-breeding period	<0.1%	<0.1%	0.5%	<0.7%
	Attend-colony period, Scenario 1	1.6%	8.1%	14.7%	24.4%
	Attend-colony period, Scenario 2	0.5%	1.1%	1.7%	3.3%
	<b>Lesser black-backed gull</b>				
	Attend-colony period, Scenario 1	0.1%	0.3%	3.3%	3.7%
	Attend-colony period, Scenario 3	<0.1%	<0.1%	0.8%	<1.0%
	<b>Puffin</b>				
	Post-breeding period	0.3%	0.6%	1.3%	2.1%
	Non-breeding period	<0.1%	0.4%	0.3%	<0.8%
	Attend-colony period, Scenario 1	1.0%	1.1%	2.8%	4.9%
Attend-colony period, Scenario 2	0.8%	0.9%	1.8%	3.5%	

Effect arising from project	Predicted impact and assessment of likely significant effect				
	SPA	Neart na Gaoithe	Inch Cape	Firth of Forth	CIA (sum of three developments)
<b>Razorbill</b>					
Chicks-on-sea period		0.3%	2.4%	4.7%	7.4%
Post-breeding period		2.0%	1.4%	3.2%	6.6%
Non-breeding period		0.2%	0.4%	1.0%	1.6%
Attend-colony period, Scenario 1		3.4%	8.8%	18.2%	30.4%
Attend-colony period, Scenario 2		2.3%	3.0%	5.0%	10.3%

NNG = Neart na Gaoithe, IC = Inch Cape Offshore Wind Farm, FOF = Firth of Forth Round 3 Zone Offshore Wind Farm.

- Arctic tern: The greatest loss of access to resources occurs during the autumn passage period when up to 3.1% may be lost to Arctic terns across all three developments. The relatively small area lost and its temporary nature as birds on passage will move on to other suitable foraging locations means that it is not predicted that any adverse effects will occur on passage Arctic terns.
- Gannet: The displacement assessment predicts a potential loss to resources of up to 8.3% for gannet during the breeding period when birds are constrained by the need to return to the colony. Outside the breeding season the predicted loss of resources is lower at 0.4%. Gannets are known to have extensive foraging ranges and the potential loss of 5.4% of resources across all three proposed developments is relatively small. The ability for gannets that may be displaced to relocate elsewhere is predicted to be high due to their extensive foraging ranges and the mobile nature of their prey. Consequently, it is predicted that there will not be an adverse effect on gannets from potential displacement.
- Guillemot: The highest level of displacement is predicted to occur during the colony attendance period when it is predicted that there will be a reduction in access to resources of up to 51.5% for guillemots from Forth Islands SPA from all three proposed offshore wind farms. The potential loss of access to foraging resources up to 51.5% is relatively high compared to Neart na Gaoithe on its own and there is potential for an effect on guillemots should the level of displacement cause corresponding effects on mortality or fecundity. However, this assumes that all displaced guillemots across the three proposed development sites originate from the Forth Islands SPA. This is an unrealistic assumption and there are breeding colonies within the mean maximum foraging range of guillemot from which a proportion of birds displaced will originate. Based on a more realistic scenario that not all guillemots displaced are from Forth Islands SPA it is predicted that 7.5% of guillemots will be from the SPA. A potential loss of up to 7.5% of foraging habitat is not predicted to cause an adverse effect as displaced birds will be able to forage elsewhere. Outside the colony attendance period the proportion of guillemots from Forth Islands SPA predicted to be displaced is lower and no higher than 1.3% of resources. It is predicted that there will not be an adverse effect on guillemots from potential displacement impacts.
- Herring gull: The potential reduction in access to resources of up to 0.8% for herring gulls in-combination with other planned offshore wind farms during any period is predicted to not cause an adverse effect.
- Kittiwake: Forth Islands SPA is within the mean maximum foraging range for kittiwake with respect to all three proposed developments. Assuming all kittiwakes displaced are from the Forth Islands SPA then up to 24.4% may be displaced. However, there are a number of other colonies in the region from which some kittiwakes at risk of displacement will originate from and it is predicted that there will be a loss of resources for kittiwakes from the Forth Islands SPA of 3.3%. Kittiwakes are highly mobile and will be able to locate suitable foraging areas outside the area of displacement and therefore the potential loss of access to resources of up to 3.3% for kittiwakes is not predicted to cause an adverse effect. Outside the breeding period the potential loss of resources is lower at 1% or less and birds will be more mobile than during the breeding period. Therefore, it is predicted that there will not be an adverse effect from displacement on kittiwakes.
- Lesser black-backed gull: During the breeding season a total loss of up to 3.7% of resources may occur in-combination with the three proposed offshore wind farms. Following breeding, when lesser black-backed gulls disperse, the predicted number of displaced birds is lower. The loss of up to 3.7% of foraging habitat is not predicted to cause an adverse effect, as birds will be able to relocate to other suitable feeding areas.
- Puffin: During the breeding season, up to 3.5% of the foraging habitat for puffins from the Forth Islands SPA may be lost in-combination with other proposed developments. Following breeding this reduced to 2.1% during the post-breeding period and 0.8% during the winter. The relatively small effect of no more than 3.5% of foraging habitat suggests that there will be no adverse effect.
- Razorbill: During the breeding period up to 10.3% of the foraging habitat of razorbills from the Forth Islands SPA may be lost in-combination with other proposed developments. Following breeding when adults with chicks the displacement effect is smaller and 7.4% of the foraging habitat may be lost. Displaced birds will be able to forage elsewhere but should the level of displacement cause a corresponding increase in mortality or decrease in fecundity then there is potential for an adverse effect to occur.

**In-combination – Barrier effect**

- Arctic tern: Terns are not known to be displaced from offshore wind farms and no barrier effects are predicted to occur to Arctic terns from the proposed developments.
- Gannet: Barrier effect assessment predicts up to 65% of all flights from the Bass Rock (part of the Forth Islands SPA) may be affected by increasing foraging flights by up to 16%. This will cause an increase in energetic costs as birds may fly further than they may have otherwise done so. However, gannets are adept at flying and regularly fly long distances to find food during the breeding season. The distance of each flight is highly variable and depends on the location and availability of prey at the time. Gannets are adapted to flying further if need be and the prey is available and consequently, the potential increase in flight distances arising from all three developments combined is unlikely to cause an adverse effect.
- Guillemot: There is predicted to be a potential increase in flight length of 5% for 10% of flights from the Forth Islands SPA due to the proposed Inch Cape Offshore Wind Farm and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm. The potential for an in-combination increase in barrier effects from Fowlsheugh SPA is predicted to be low and any incremental increase in flight duration will be small. Therefore no in-combination adverse effects are predicted.
- Herring gull: Barrier effects on herring gulls have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there might be an increase in flight length from the proposed Inch Cape Offshore Wind Farm of 6% for less than 5% of the flights and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.
- Kittiwake: Barrier effects on kittiwakes have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there they may be increase in flight length from the proposed Inch Cape Offshore Wind Farm of 6% for 5% of the flights and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.

Effect arising from project	Predicted impact and assessment of likely significant effect																
	<ul style="list-style-type: none"> <li>● Puffin: There is predicted to be a potential increase in flight length of 6% for 10% of flights from the Forth Islands SPA due to the proposed Inch Cape Offshore Wind Farm and a negligible increase from the Firth of Forth Round 3 Zone Offshore Wind Farm. The potential for an in-combination increase in barrier effects from Fowlsheugh SPA is predicted to be low and any incremental increase in flight duration will be small. Therefore, no in-combination adverse effects are predicted.</li> <li>● Razorbill: no barrier effects are predicted to occur from either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms due to their distance from the breeding colonies.</li> </ul> <p><b>In-combination – Collision risk</b></p> <ul style="list-style-type: none"> <li>● Arctic tern: Less than one Arctic tern per year is predicted to collide with the proposed Neart na Gaoithe Offshore Wind Farm. Although data to undertake cumulative collision risk modelling are not available it is predicted that the potential for collision risk at other proposed offshore wind farms is low due to the low number of birds flying at rotor height.</li> <li>● Gannet: Collision risk modelling undertaken for all three proposed offshore wind farms combined and based on a worst-case 98% avoidance rate predicts up to 8,224 adult gannet collisions per year. Based on a 99.5% avoidance rate and a smaller number of larger turbines, then the predicted number of collisions from all three sites is 760 collisions per year which is an increase in baseline mortality of 7.6%. There is therefore the potential for an effect on gannets in-combination with other offshore wind farms.</li> <li>● Guillemot: Predicted number of impacts is very low due to very low risk of collision and no adverse in-combination effects are predicted.</li> <li>● Herring gull: During the breeding season collision risk modelling predicts that between 3.1 and 25.8 herring gulls may collide with the proposed Inch Cape Offshore Wind Farm and 6.3 and 9.9 with the Firth of Forth Round 3 Zone. During the non-breeding period it is predicted that between 0.4 and 3.2 collisions may occur from Inch Cape, and 3.7 and 5.8 collisions from Firth of Forth Round 3 Zone, depending on turbine design scenarios. The current population is described as being in unfavourable condition and declining and the incremental cumulative in-combination impact may constrain any future potential for recovery.</li> <li>● Lesser black-backed gull: The total number of collisions of lesser black-backed gulls predicted from the proposed Inch Cape Offshore Wind Farm is between 0 and 756 per year, depending on the turbine design scenario. The predicted number of collisions from the Firth of Forth Round 3 Zone is between 1 and 1.5 birds per year. The total number of collisions predicted could potentially cause an adverse effect.</li> <li>● Kittiwake: During the breeding season, collision risk modelling predicts between 1.3 and 137.1 adult kittiwakes may collide with the proposed Inch Cape Offshore Wind Farm and between 55 and 88.7 with the Firth of Forth Round 3 Zone. During the non-breeding period between 0 and 5.8 collisions may occur with Inch Cape and 21.6 and 34.8 with the Firth of Forth Round 3 Zone. The total number of collisions with all three proposed wind farms combined is predicted to be between 117.7 and 325.8 per year. The current population is described as being in unfavourable condition and the incremental cumulative in-combination impact may cause an effect that constrains any future potential for recovery.</li> </ul> <p>The proposed Beatrice Offshore Wind Farm predicts an annual mortality of up to 265 gannets per year based on a 98% avoidance rate and 66 birds per year on a 99.5% avoidance rate (BOWF, 2012). The proposed development lies 255 km from the Forth Islands SPA and is therefore within the mean maximum foraging range for this species. Consequently, it is possible that some birds at risk of collision during the breeding season may originate from the SPA.</p> <p>The proposed Moray Firth Offshore Wind Farm predicts an annual mortality of up to 160 gannets per year.</p> <p>There are six gannet colonies closer to the proposed developments in the Moray Firth than the Bass Rock and therefore the majority of gannets recorded within the Beatrice and Moray Firth Offshore Wind Farms are predicted to be from these colonies, in particular the colony at Troup Head. It is predicted that the in-combination impacts arising from these two proposed developments will be negligible.</p>																
<p><b>Conclusions</b></p>	<table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td><b>Seabird assemblage</b></td> <td>See below.</td> </tr> <tr> <td><b>Fulmar</b></td> <td>No displacement or disturbance impacts predicted and very low risk of collision mortality. No adverse effect. No predicted in-combination adverse effect.</td> </tr> <tr> <td><b>Gannet</b></td> <td>Collision deaths causing up to ca. 1.0% per year increase in adult mortality rate (based on a 98% Band avoidance rate and assuming 90% far field displacement). However, a lower avoidance rate increases the risk of an adverse effect. The population is in favourable condition. No adverse effect. Potential for in-combination effect.</td> </tr> <tr> <td><b>Cormorant</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.</td> </tr> <tr> <td><b>Shag</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.</td> </tr> <tr> <td><b>Lesser black-backed gull</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. Potential for in-combination adverse effect.</td> </tr> <tr> <td><b>Herring gull</b></td> <td>Collision deaths causing an increase in baseline mortality of up to 2.1% per year. The population is in favourable and maintained condition and therefore an increase in baseline mortality of 2.1% is predicted to not cause an adverse effect. No adverse effect. No predicted in-combination adverse effect.</td> </tr> </tbody> </table>	Qualifying feature	Reason	<b>Seabird assemblage</b>	See below.	<b>Fulmar</b>	No displacement or disturbance impacts predicted and very low risk of collision mortality. No adverse effect. No predicted in-combination adverse effect.	<b>Gannet</b>	Collision deaths causing up to ca. 1.0% per year increase in adult mortality rate (based on a 98% Band avoidance rate and assuming 90% far field displacement). However, a lower avoidance rate increases the risk of an adverse effect. The population is in favourable condition. No adverse effect. Potential for in-combination effect.	<b>Cormorant</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.	<b>Shag</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.	<b>Lesser black-backed gull</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. Potential for in-combination adverse effect.	<b>Herring gull</b>	Collision deaths causing an increase in baseline mortality of up to 2.1% per year. The population is in favourable and maintained condition and therefore an increase in baseline mortality of 2.1% is predicted to not cause an adverse effect. No adverse effect. No predicted in-combination adverse effect.
Qualifying feature	Reason																
<b>Seabird assemblage</b>	See below.																
<b>Fulmar</b>	No displacement or disturbance impacts predicted and very low risk of collision mortality. No adverse effect. No predicted in-combination adverse effect.																
<b>Gannet</b>	Collision deaths causing up to ca. 1.0% per year increase in adult mortality rate (based on a 98% Band avoidance rate and assuming 90% far field displacement). However, a lower avoidance rate increases the risk of an adverse effect. The population is in favourable condition. No adverse effect. Potential for in-combination effect.																
<b>Cormorant</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.																
<b>Shag</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.																
<b>Lesser black-backed gull</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. Potential for in-combination adverse effect.																
<b>Herring gull</b>	Collision deaths causing an increase in baseline mortality of up to 2.1% per year. The population is in favourable and maintained condition and therefore an increase in baseline mortality of 2.1% is predicted to not cause an adverse effect. No adverse effect. No predicted in-combination adverse effect.																

Effect arising from project	Predicted impact and assessment of likely significant effect	
<b>Conclusions (continued)</b>	Qualifying feature	Reason
	<b>Kittiwake</b>	Collision deaths may cause up to 13.6% per year increase in baseline adult mortality rate (based on a 98% Band avoidance rate). The population is not in favourable condition. Potential for an effect. Potential for in-combination effect.
	<b>Sandwich tern</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.
	<b>Roseate tern</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.
	<b>Common tern</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.
	<b>Arctic tern</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No predicted in-combination adverse effect.
	<b>Guillemot</b>	Estimated displacement of up to ca. 3.2% and ca. 0.9% of at-sea population during colony-attendance and post-breeding periods respectively (assumes 50% displacement rate). Potential increase in foraging flights by up to 6% during the breeding period may increase energetic costs during breeding period as birds fly to and from colony. This will only occur if birds avoid flying around the proposed offshore site and if it does the relatively small increase in daily energy expenditure is predicted not to cause an adverse effect. No adverse effect. No predicted in-combination adverse effect.
	<b>Razorbill</b>	Estimated displacement of up to ca. 3.1%, ca. 5.8% and ca. 1.9% of at-sea population during colony-attendance, chicks-at-sea and post-breeding periods respectively (assumes 50% displacement rate). Potential increase in foraging flights by up to 3.8% during the breeding period may increase energetic costs during breeding period as birds fly to and from colony. This will only occur if birds avoid flying around the proposed offshore site and if it does the relatively small increase in daily energy expenditure is predicted not to cause an adverse effect. No adverse effect. Potential for in-combination effect.
<b>Puffin</b>	Estimated displacement of up to ca. 1.0% and ca. 0.4% of at-sea population during colony-attendance and post-breeding periods respectively (assumes 50% displacement rate). The distribution of puffins in the area is widespread during these periods indicating that displaced birds will be able to relocate elsewhere. Estimated that 27% (Craigleith) and 33% (Isle of May) of colony-attendance-period foraging flights potentially subject to barrier effect causing them to be between ca. 3.0% (Craigleith) and 6.7% longer (assumes all detour). This will only occur if birds avoid flying around the proposed offshore site and if it does, the relatively small increase in daily energy expenditure is predicted not to cause an adverse effect. No adverse effect. No predicted in-combination adverse effect.	

**Box 1.11 St Abb's Head to Fast Castle SPA**

*Site Information*

Topic	Information								
<b>Qualifying features of site and possible connectivity</b>  SPA is 31 km southwest of Neart na Gaoithe	<b>Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i>, 2012)</b>	<b>Site total at designation</b>	<b>Last assessed condition</b>	<b>Possible connectivity in breeding period</b>	<b>Possible connectivity in non-breeding period</b>	<b>Reason</b>			
	Seabird assemblage, breeding	79,560 i	Favourable Maintained						
	Shag, breeding* 14.5 km	560 p	Unfavourable Declining	No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys			
	Herring gull, breeding * 61.1 km	1,160 p	Unfavourable Declining	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Present in offshore site at all times of year.			
	Kittiwake, breeding * 60.0 km	21,170 p	Favourable Maintained	Yes	Yes				
	Guillemot, breeding * 84.2 km	31,750 i	Favourable Maintained	Yes	Yes				
Razorbill, breeding * 48.5 km	2,180 i	Favourable Maintained	Yes	Yes					
<p>*species qualifies as a seabird assemblage component only. i = individuals; p = pairs.</p> <p>Data from the 2 years of baseline surveys indicate that all of the seabird species that are qualifying interests at the St Abb's Head to Fast Castle SPA, except shag, regularly occur in the offshore site throughout the year. The offshore site is within the mean foraging range of these qualifying species. Therefore it is likely that some herring gulls, kittiwakes, guillemots and razorbills from the SPA forage in the offshore site in the breeding season and could be affected.</p> <p>During the non-breeding part of the year the qualifying seabird species at St Abb's Head to Fast Castle SPA are not constrained by attending their breeding colony and, with the exception of shag, all range very widely in the North Sea and beyond. Therefore, it is likely that some individuals of these qualifying species use the proposed offshore site at times during the non-breeding part of the year.</p>									
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species (other than shag) from St Abb's Head to Fast Castle SPA is estimated using Connectivity Scenario 2 for the breeding season and using Connectivity Scenario 3 for other periods of the year. Connectivity Scenario 2 is also assumed for the chick-rearing period for guillemot and razorbill.</p> <p>Tracking data for kittiwakes breeding at St Abb's Head in 2011 indicate that these birds are not likely to forage in the offshore site. The closest foraging by tracked birds was approximately 10 km southeast of the offshore site (Daunt <i>et al.</i>, 2011). These tracking results suggest that Connectivity Scenario 2 overestimates the level breeding season kittiwake connectivity between St Abb's Head to Fast Castle SPA and the offshore site, although the sample size was small.</p> <p>For all species, the potential effects of the proposed development on the St Abb's Head to Fast Castle SPA qualifying species populations during the non-breeding period of the year are assessed using Connectivity Scenario 3.</p>								
	<b>Species/qualifying feature</b>	<b>Birds present in offshore sites assumed to be from SPA</b>				<b>Birds from SPA assumed to be in the offshore site</b>			
		<b>Colony-attendance period (CS2)</b>	<b>Chicks-at-sea period (CS3)</b>	<b>Post-breeding period (CS3)</b>	<b>Winter period (CS3)</b>	<b>Colony-attendance period (CS2)</b>	<b>Chicks-at-sea period (CS3)</b>	<b>Post-breeding period (CS3)</b>	<b>Winter period (CS3)</b>
	Herring gull	1.4%	NA	NA	0.2%	0.06%, (<1)	NA	NA *	0.08%, (<1)
	Kittiwake	33.4%	NA	6.8%	6.8%	0.81%, (115)	NA	0.42%, (89)	0.04%, (9)
	Guillemot	32.3%	32.3%	14.5%	14.5%	1.2%, (263)	0.34%, (189)	1.8%, (998)	0.18%, (137)
Razorbill	18.7%	18.7%	4.0%	4.0%	2.0%, (19)	6.0%, (155)	3.7%, (95)	0.32%, (8)	

	*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.
<b>Conservation objectives of site</b>	<p>The conservation objectives for St Abb's Head to Fast Castle SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>

### Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
<b>Displacement and Disturbance</b>	<p>The percentages of the St Abb's Head to Fast Castle SPA populations estimated to be present in the offshore site buffered to 1 km provide an approximate indication of the value of this area in terms of the proportion of the foraging resources for the SPA populations that it may provide.</p> <p>Based on information from existing studies, herring gull and kittiwake may experience up to 25% displacement, guillemot and razorbill up to 50% displacement.</p> <p>Given the very large areas of foraging habitat available and the large natural spatial and temporal variations in prey abundance, it is unlikely that losses of potential foraging resource of less than 1% would result in a discernible adverse effect on population and so such impacts are classed as having no adverse effect.</p> <p>For all qualifying species other than guillemot and razorbill, irrespective of the displacement rate, the offshore site is of very low value to the SPA population and, therefore, even if all individuals were displaced the impact on the population is likely to be negligible. Therefore there is predicted to be no adverse effect of displacement for herring gull or kittiwake.</p> <p>The scale of magnitude of the potential effects arising from displacement of guillemot and razorbill during the breeding and post-breeding periods is sufficient to give cause for concern regarding potential adverse effects on the Favourable Conservation Status of the guillemot and razorbill populations breeding at this SPA. The impacts of displacement, should it occur, are uncertain. However, it is not predicted that individuals displaced will die or that the displacement will cause any significant increase in mortality. The distribution of the guillemots and razorbills in the Forth and Tay area is widespread, therefore indicating that displaced birds will be able to relocate to other areas without a significant adverse effects.</p>
<b>Barrier Effect</b>	<p><b>Herring gull, kittiwake and guillemot</b></p> <p>For herring gull, kittiwake and guillemot if it is assumed that the destinations of affected flights are on average 10 km behind the proposed wind farm, then the mean increase in the length of affected flights is estimated to be 2.8%. On this basis, it is cautiously estimated that the overall barrier effect on the St Abb's Head to Fast Castle SPA populations of these three species would be to increase the average breeding season foraging trip distance by approximately 0.13%.</p> <p><b>Razorbill</b></p> <p>For razorbill, if it is assumed that the destinations of affected flights are on average immediately behind (0 km) the proposed wind farm, then the mean increase in the length of affected flights caused by the barrier effect is estimated at 17.1%. On this basis, it is cautiously estimated that the overall barrier effect on the St Abb's Head to Fast Castle SPA razorbill population would be to increase the average breeding season foraging trip distance by approximately 0.2%.</p>
<b>Collision Mortality</b>	<p>The number of collision deaths of a species that are likely to be attributable to the St Abb's Head to Fast Castle SPA populations can be estimated by multiplying the total number of deaths due to collision estimated by CRM for that period of the year by the assumed connectivity. The only qualifying species populations for which there is potential for an adverse effect by collision mortality are herring gull and kittiwake. For all other qualifying species, the proportion of flight activity recorded during baseline surveys at rotor height was either zero or negligible and therefore no appreciable mortality was predicted by CRM.</p> <p><b>Kittiwake</b></p> <p>Kittiwakes show little if any displacement response to wind farms, therefore it is likely that the amount of flight activity during the operational stage will be similar to that recorded during the baseline surveys.</p> <p>For the worst-case scenarios for CRM it is predicted, using a 98% avoidance rate, that 14 adult kittiwakes might be killed annually by collision during the breeding season from the St Abb's to Fast Castle SPA.</p> <p>During the non-breeding period up to 4.2 adult kittiwakes per year may be impacted from the St Abb's to Fast Castle SPA population.</p> <p>The effect of an additional mortality of 18.2 adults per year from the St Abb's to Fast Castle SPA population would be to increase the baseline adult mortality rate by 3.2%. If a 99.5% Band avoidance rate is assumed, then the estimated change to the baseline mortality rate is reduced and the increase in baseline mortality would be 0.6%</p> <p><b>Herring gull</b></p> <p>Herring gull shows little or no displacement from offshore wind farms. During the breeding season it is predicted that up to 0.6 birds per year may collide with Neart na Gaoithe, an increase of 0.5% above baseline mortality rate. The herring gull population is not in Favourable Conservation Status and therefore any increase in additional mortality may increase the effect. However, the overall increase in additional mortality of one bird every 4 years is not predicted to affect the conservation status of herring gull.</p> <p>During the non-breeding season 0.4 deaths per year from collisions are predicted. This will not cause an adverse effect on herring gulls at St Abb's Head to Fast Castle SPA.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect				
Collision Mortality (continued)	Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate	
	Herring gull	Breeding period (CS1)		0.6	0.5%
		Non-breeding period (CS3)		0.4	0.3%
		Whole year (CS1/CS3)		0.44	0.88%
	Kittiwake	Breeding period (CS1)		14.0	2.5%
		Non-breeding periods (CS3)		4.2	0.8%
		Whole year (CS1/CS3)		18.2	3.3%
In-Combination Effects	In-combination Displacement				
	SPA	Neart na Gaoithe	Inch Cape	Firth of Forth	CIA (sum of three developments)
	<i>St Abb's Head to Fast Castle</i>				
	<b>Guillemot</b>				
	Attend-colony period	0.6%	1.2%	5.1%	6.9%
	Chicks-on-sea period	<0.1%	0.4%	0.7%	1.1%
	Post-breeding period	0.8%	0.2%	0.3%	1.3%
	Winter period	0.1%	0.2%	0.7%	1.1%
	<b>Herring gull</b>				
	Breeding period	<0.1%	<0.1%	0.2%	<0.4%
	Non-breeding period	<0.1%	<0.1%	<0.1%	<0.3%
	<b>Kittiwake</b>				
	Breeding period	0.2%	0.7%	2.1%	3.0%
	Post-breeding	0.3%	0.2%	0.4%	1.0%
	Winter period	<0.1%	<0.1%	0.5%	<0.7%
	<b>Razorbill</b>				
	Attend-colony period	1.2%	1.8%	5.9%	8.9%
	Chicks-on-sea period	0.3%	2.4%	4.7%	7.4%
	Post-breeding period	2.0%	1.4%	3.2%	6.6%
	Winter period	0.2%	0.4%	1.0%	1.6%
NNG = Neart na Gaoithe, IC = Inch Cape Offshore Wind Farm, FOF = Firth of Forth Round 3 Zone Offshore Wind Farm.					
<ul style="list-style-type: none"> <li>● Guillemot: The highest level of displacement is predicted to occur during the colony attendance period when it is predicted a reduction in access to resources of up to 6.9% for guillemots from St Abb's head to Fast Castle SPA from all three proposed offshore wind farms. The potential loss of access to foraging resources of up to 6.9% is relatively high compared but displaced birds will be able to forage elsewhere. It is predicted that that there will not be an adverse effect on guillemots from potential displacement impacts.</li> <li>● Herring gull: The potential reduction in access to resources of up to 0.4% for herring gulls in-combination with other planned offshore wind farms during any period is predicted to not cause an adverse effect.</li> <li>● Kittiwake: It is predicted that up to 3% of the foraging resources for kittiwakes originating from St Abb's Head to fast castle SPA may be lost from all three proposed developments combined. Kittiwakes are highly mobile and will be able to locate suitable foraging areas outside the area of displacement and therefore the potential loss of access to resources of up to 3.0% for kittiwakes is not predicted to cause an adverse effect. Outside the breeding period the potential loss of resources is lower at 1% or less and birds will be more mobile than during the breeding period. Therefore, it is predicted that there will not be an adverse effect from displacement on kittiwakes.</li> </ul>					

Effect arising from project	Predicted impact and assessment of likely significant effect															
	<ul style="list-style-type: none"> <li>● Razorbill: During the breeding period up to 8.9% of the foraging habitat of razorbills from the Forth Islands SPA may be lost in-combination with other proposed developments. Following breeding when adults with chicks the displacement effect is smaller and 7.4% of the foraging habitat may be lost. Displaced birds will be able to forage elsewhere but should the level of displacement cause a corresponding increase in mortality or decrease in fecundity then there is potential for an adverse effect to occur.</li> </ul> <p><b>In-combination – Barrier effect</b></p> <ul style="list-style-type: none"> <li>● Guillemot: No in-combination barrier effects are predicted to occur with either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> <li>● Herring gull: Barrier effects on herring gulls have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there might be an increase in flight length from the proposed Inch Cape Offshore Wind Farm of 6% for less than 5% of the flights and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.</li> <li>● Kittiwake: Barrier effects on kittiwakes have not been reported from other offshore wind farms and no barrier effects are predicted. Should they occur then there may be an increase in flight length from the proposed Inch Cape Offshore Wind Farm of 6% for 5% of the flights and no increase from the Firth of Forth Round 3 Zone Offshore Wind Farm.</li> <li>● Razorbill: no barrier effects are predicted to occur from either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms due to their distance from the breeding colonies.</li> </ul> <p><b>In-combination – Collision risk</b></p> <ul style="list-style-type: none"> <li>● Guillemot: Predicted number of impacts very low due to very low risk of collision and no adverse in-combination affects predicted.</li> <li>● Herring gull: During the breeding season collision risk modelling predicts between 0.2 and 1.8 herring gulls may collide with the proposed Inch Cape Offshore Wind Farm and 0.4 and 1.3 with the Firth of Forth Round 3 Zone. During the non-breeding period it is predicted that between 0.4 and 3.2 collisions may occur from Inch Cape, and 0.4 and 1.3 from Firth of Forth Round 3 Zone depending on turbine design scenarios. The current population is described as being in unfavourable condition and declining and the incremental cumulative in-combination impact may constrain any future potential for recovery but the number of collisions predicted per year is low and is unlikely to adversely affect the current population.</li> <li>● Kittiwake: During the breeding season ,collision risk modelling predicts between 1.2 and 129.1 adult kittiwakes may collide with the proposed Inch Cape Offshore Wind Farm and between 104.7 and 168.8 with the Firth of Forth Round 3 Zone. During the non-breeding period between 0 and 5.8 collisions are predicted with Inch Cape and between 34.7 and 56 with the Firth of Forth Round 3 Zone. The total number of potential collisions across all three proposed wind farms is between 152.9 and 378 adult kittiwakes per year. The current population is described as being in unfavourable condition and the incremental cumulative in-combination impact may constrain any future potential for recovery.</li> <li>● Razorbill: Predicted number of impacts very low due to very low risk of collision and no adverse in-combination affects predicted.</li> </ul>															
<p><b>Conclusions</b></p>	<table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>Seabird assemblage</td> <td>See below.</td> </tr> <tr> <td>Shag</td> <td>Very few shags recorded, low flight heights predicted and no barrier effects. Little if any displacement. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td>Herring gull</td> <td>Although the population is in unfavourable condition the predicted increase in baseline mortality rate of 0.88% per year is low and unlikely to affect the current population. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td>Kittiwake</td> <td>A predicted increase in baseline mortality of up to 2.4% per year for a population currently in unfavourable condition. No adverse effect. Potential for in-combination effect.</td> </tr> <tr> <td>Guillemot</td> <td>Estimated displacement of up to ca. 0.6% and 0.90% of the population during the colony-attendance and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td>Razorbill</td> <td>Estimated displacement of up to 1.0%, 3.0% and 1.9% of the population during the colony-attendance, chicks-at-sea and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. Potential for in-combination effect.</td> </tr> </tbody> </table>	Qualifying feature	Reason	Seabird assemblage	See below.	Shag	Very few shags recorded, low flight heights predicted and no barrier effects. Little if any displacement. No adverse effect. No in-combination adverse effect.	Herring gull	Although the population is in unfavourable condition the predicted increase in baseline mortality rate of 0.88% per year is low and unlikely to affect the current population. No adverse effect. No in-combination adverse effect.	Kittiwake	A predicted increase in baseline mortality of up to 2.4% per year for a population currently in unfavourable condition. No adverse effect. Potential for in-combination effect.	Guillemot	Estimated displacement of up to ca. 0.6% and 0.90% of the population during the colony-attendance and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. No in-combination adverse effect.	Razorbill	Estimated displacement of up to 1.0%, 3.0% and 1.9% of the population during the colony-attendance, chicks-at-sea and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. Potential for in-combination effect.	
Qualifying feature	Reason															
Seabird assemblage	See below.															
Shag	Very few shags recorded, low flight heights predicted and no barrier effects. Little if any displacement. No adverse effect. No in-combination adverse effect.															
Herring gull	Although the population is in unfavourable condition the predicted increase in baseline mortality rate of 0.88% per year is low and unlikely to affect the current population. No adverse effect. No in-combination adverse effect.															
Kittiwake	A predicted increase in baseline mortality of up to 2.4% per year for a population currently in unfavourable condition. No adverse effect. Potential for in-combination effect.															
Guillemot	Estimated displacement of up to ca. 0.6% and 0.90% of the population during the colony-attendance and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. No in-combination adverse effect.															
Razorbill	Estimated displacement of up to 1.0%, 3.0% and 1.9% of the population during the colony-attendance, chicks-at-sea and post-breeding periods respectively. However, displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effect. Potential for in-combination effect.															

**Box 1.12 Farne Islands SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 72 km south of Neart na Gaoithe	Seabird assemblage, breeding	142,490**	No information available			
	Cormorant, breeding* 25 km	not given**		No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys.
	Shag, breeding* 14.5 km	not given**		No	No	
	Kittiwake, breeding* 60.0 km	not given**		No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion potentially present in offshore site only in non-breeding period.
	Sandwich tern, breeding 49.0 km	2,070 p		No	No	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys.
	Roseate tern, breeding 16.6 km	3 p**		No	No	
	Common tern, breeding 15.2 km	230 p		No	No	Offshore site beyond mean maximum foraging range of SPA. Rarely present in offshore site during breeding season. Occasionally present in low numbers in offshore site in autumn passage period.
	Arctic tern, breeding 24.2 km	2,840 p		No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site in autumn passage period.
	Guillemot, breeding 84.2 km	23,499 p**		Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site at all times of year.
	Puffin, breeding 105.4 km	34,710 p**		Yes	Yes	

\*species qualifies as a seabird assemblage component only. \*\* SPA review -population figure. p = pairs.

Data from the 2 years of baseline surveys indicate that some of the qualifying species at the Farne Islands SPA do not use the offshore site, or use it so rarely that they could not plausibly be affected. These species are cormorant, shag, roseate tern, Sandwich tern and common tern. For kittiwake and Arctic tern, the offshore site is beyond the mean maximum foraging range of these species and so no birds in the offshore site in the breeding season are likely to be from the Farne Islands SPA, however individuals from this SPA may occur in the offshore site in the non-breeding period. The offshore site is within the mean maximum foraging range of guillemot and puffin, and therefore a proportion of birds in the offshore site in the breeding season could be from the Farne Islands SPA. Individuals from this SPA may also occur in the offshore site in the non-breeding period.

Topic	Information																																																					
Importance of site to connected species	<p>The importance of the proposed offshore site for foraging for individuals from Farne Islands SPA populations of kittiwake, guillemot and puffin is estimated using Connectivity Scenario 2 for the breeding season and using Connectivity Scenario 3 for other periods of the year. Connectivity Scenario 2 is also assumed for the chick-rearing period for guillemot.</p> <p>For Arctic tern Connectivity Scenario 3 is also used, but breeding colonies as far north as Shetland are taken into account, rather than just those in the defined breeding region used for other species (Peterhead to Blyth). This approach is taken due to the large numbers of Arctic tern encountered on occasion in the autumn passage period in the outer Firth of Forth and strongly suggests that birds from beyond the region are passing through the area on migration. The origins of the birds present at this time of year are not understood in detail but are likely to include breeding sites across eastern Scotland including Shetland and Northumberland, and probably Scandinavia as well. Therefore, the assessment of Arctic tern for the autumn passage period is based on comparison against the breeding population for Shetland to Northumberland (98,052 adults, derived from Mitchell <i>et al.</i> 2004, see chapter 12: Ornithology).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="background-color: #800040; color: white;">Species/qualifying feature</th> <th colspan="4" style="background-color: #800040; color: white;">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4" style="background-color: #800040; color: white;">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td><b>Kittiwake</b></td> <td>None</td> <td>NA</td> <td>3.0%</td> <td>3.0%</td> <td>None</td> <td>NA</td> <td>0.42%, (40)</td> <td>0.04%, (4)</td> </tr> <tr> <td><b>Arctic tern</b></td> <td>None</td> <td>NA</td> <td>5.8%</td> <td>None</td> <td>None</td> <td>NA</td> <td>0.35%, (11)</td> <td>None</td> </tr> <tr> <td><b>Guillemot</b></td> <td>16.1%</td> <td>20.3%</td> <td>20.3%</td> <td>20.3%</td> <td>0.5% (149)</td> <td>0.15%, (118)</td> <td>1.8%, (1394)</td> <td>0.18%, (137)</td> </tr> <tr> <td><b>Puffin</b></td> <td>14.2%</td> <td>NA</td> <td>37.7%</td> <td>37.7%</td> <td>0.4% (267)</td> <td>NA</td> <td>0.76%, (749)</td> <td>0.02%, (20)</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	<b>Kittiwake</b>	None	NA	3.0%	3.0%	None	NA	0.42%, (40)	0.04%, (4)	<b>Arctic tern</b>	None	NA	5.8%	None	None	NA	0.35%, (11)	None	<b>Guillemot</b>	16.1%	20.3%	20.3%	20.3%	0.5% (149)	0.15%, (118)	1.8%, (1394)	0.18%, (137)	<b>Puffin</b>	14.2%	NA	37.7%	37.7%	0.4% (267)	NA	0.76%, (749)	0.02%, (20)
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																																																	
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																																														
<b>Kittiwake</b>	None	NA	3.0%	3.0%	None	NA	0.42%, (40)	0.04%, (4)																																														
<b>Arctic tern</b>	None	NA	5.8%	None	None	NA	0.35%, (11)	None																																														
<b>Guillemot</b>	16.1%	20.3%	20.3%	20.3%	0.5% (149)	0.15%, (118)	1.8%, (1394)	0.18%, (137)																																														
<b>Puffin</b>	14.2%	NA	37.7%	37.7%	0.4% (267)	NA	0.76%, (749)	0.02%, (20)																																														
Conservation objectives of site	<p>The conservation objectives for Farne Islands SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																																					

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	<p>Based on information from existing studies, kittiwake and Arctic tern may experience up to 25% displacement, guillemot and puffin up to 50% displacement.</p> <p>Given the very large areas of foraging habitat available and the large natural spatial and temporal variation in prey abundance, it is unlikely that losses of potential foraging resources of less than 1% would result in a discernible adverse effect on a population and so such impacts are classed as having no adverse effect.</p> <p>For all qualifying species other than guillemot and puffin, irrespective of the displacement rate, the offshore site is of very low value to the SPA population and, therefore, even if all individuals were displaced the impact on the population is likely to be negligible. Therefore there is predicted to be no adverse effect of displacement for kittiwake or Arctic tern.</p> <p>For guillemot, if 50% of individuals were displaced from the offshore site and buffer, this is estimated to amount to an effective loss of 0.90% in the foraging resources used in the post-breeding periods. For puffin, if 50% of individuals were displaced from the offshore site buffered to 1 km this is estimated to amount to an effective loss of 0.65% in the chicks-on-sea period and 1.9% in the post-breeding period.</p>
Barrier Effect	<p>The large distance (72 km) between the SPA and the offshore site and the very small number of individuals of qualifying species from this SPA likely forage in the offshore site during the breeding season means that it is not predicted that the Development will present a significant barrier effect to foraging birds from the Farne Islands SPA.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect																																																																				
<b>Collision Mortality</b>	<p>The number of collision deaths of a species that are likely to be attributable to the Farne Islands SPA populations can be estimated by multiplying the total number of deaths due to collision estimated by CRM for that period of the year by the assumed connectivity.</p> <p>The only qualifying species' population that may be adversely affected by collision mortality is kittiwake. For all other qualifying species, the proportion of flight activity recorded during baseline surveys at rotor height was either zero or negligible and therefore no appreciable mortality was predicted by CRM.</p> <p><b>Kittiwake</b></p> <p>Kittiwakes show little if any displacement response to wind farms, therefore it is likely that the amount of flight activity during the operational stage will be similar to that recorded during the baseline surveys.</p> <p>For the worst-case scenarios for CRM, it is predicted, using a 98% avoidance rate, that 33 adult kittiwakes would be killed annually by collision during the non-breeding period. Assuming Connectivity Scenario 3, it is estimated that on average 0.8 of these (2.4%) would be adults from the Farne Islands SPA.</p> <p>The least adverse turbine scenario (64 x 7MW) of the Rochdale Envelope is predicted to result in one third fewer kittiwake collision deaths. Therefore, this design is predicted to lead to changes in baseline adult mortality rate of approximately 1.47% and 0.74% for 98% and 99% Band avoidance rates, respectively. The two other designs examined are intermediate.</p> <p>The effect of an additional mortality of 0.8 adults per year from the Farne Islands SPA population would be to increase the adult baseline mortality rate by 0.47%. If a 99% Band avoidance rate is assumed, then the estimated change to the baseline mortality rate is 0.24%.</p>																																																																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #800040; color: white;">Qualifying feature</th> <th style="background-color: #800040; color: white;">Time of year (assumed connectivity scenario)</th> <th style="background-color: #800040; color: white;">Estimated deaths per year for 98% avoidance rate</th> <th style="background-color: #800040; color: white;">% change in baseline mortality rate</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="background-color: #e0e0e0; text-align: center;"><b>Kittiwake</b></td> <td>Breeding period (CS1)</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0%</td> </tr> <tr> <td>Non-breeding period (CS3)</td> <td style="text-align: center;">0.8</td> <td style="text-align: center;">0.47%</td> </tr> <tr> <td>Whole year (CS1/CS3)</td> <td style="text-align: center;">0.8</td> <td style="text-align: center;">0.47%</td> </tr> </tbody> </table>				Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate	<b>Kittiwake</b>	Breeding period (CS1)	0	0%	Non-breeding period (CS3)	0.8	0.47%	Whole year (CS1/CS3)	0.8	0.47%																																																			
	Qualifying feature	Time of year (assumed connectivity scenario)	Estimated deaths per year for 98% avoidance rate	% change in baseline mortality rate																																																																	
	<b>Kittiwake</b>	Breeding period (CS1)	0	0%																																																																	
Non-breeding period (CS3)		0.8	0.47%																																																																		
Whole year (CS1/CS3)		0.8	0.47%																																																																		
<b>In-combination Displacement</b>																																																																					
<b>In-Combination Effects</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #800040; color: white;">SPA</th> <th style="background-color: #800040; color: white;">Neart na Gaoithe</th> <th style="background-color: #800040; color: white;">Inch Cape</th> <th style="background-color: #800040; color: white;">Firth of Forth</th> <th style="background-color: #800040; color: white;">CIA (sum of three developments)</th> </tr> </thead> <tbody> <tr> <td colspan="5" style="background-color: #e0e0e0;"><b>Farne Islands</b></td> </tr> <tr> <td colspan="5" style="background-color: #e0e0e0;"><b>Arctic tern</b></td> </tr> <tr> <td>Autumn passage</td> <td style="text-align: center;">0.6%</td> <td style="text-align: center;">0.2%</td> <td style="text-align: center;">2.6%</td> <td style="text-align: center;">3.4%</td> </tr> <tr> <td colspan="5" style="background-color: #e0e0e0;"><b>Guillemot</b></td> </tr> <tr> <td>Attend-colony period</td> <td style="text-align: center;">&lt;0.1%</td> <td style="text-align: center;">&lt;0.1%</td> <td style="text-align: center;">&lt;0.1%</td> <td style="text-align: center;">&lt;0.3%</td> </tr> <tr> <td>Chicks-on-sea period</td> <td style="text-align: center;">&lt;0.1%</td> <td style="text-align: center;">0.4%</td> <td style="text-align: center;">0.7%</td> <td style="text-align: center;">&lt;1.2%</td> </tr> <tr> <td>Post-breeding period</td> <td style="text-align: center;">0.8%</td> <td style="text-align: center;">0.2%</td> <td style="text-align: center;">0.3%</td> <td style="text-align: center;">1.3%</td> </tr> <tr> <td>Winter period</td> <td style="text-align: center;">0.1%</td> <td style="text-align: center;">0.2%</td> <td style="text-align: center;">0.7%</td> <td style="text-align: center;">1.1%</td> </tr> <tr> <td colspan="5" style="background-color: #e0e0e0;"><b>Puffin</b></td> </tr> <tr> <td>Attend-colony period</td> <td style="text-align: center;">0.2%</td> <td style="text-align: center;">0.3%</td> <td style="text-align: center;">1.0%</td> <td style="text-align: center;">1.5%</td> </tr> <tr> <td>Post-breeding period</td> <td style="text-align: center;">0.3%</td> <td style="text-align: center;">0.6%</td> <td style="text-align: center;">1.3%</td> <td style="text-align: center;">2.1%</td> </tr> <tr> <td>Winter period</td> <td style="text-align: center;">&lt;0.1%</td> <td style="text-align: center;">0.4%</td> <td style="text-align: center;">0.3%</td> <td style="text-align: center;">&lt;0.8%</td> </tr> </tbody> </table> <p>NNG = Neart na Gaoithe, IC = Inch Cape Offshore Wind Farm, FA = Firth of Forth Round 3 Zone Offshore Wind Farm.</p> <ul style="list-style-type: none"> <li>● Arctic tern: The greatest loss of access to resources occurs during the autumn passage period when up 3.4% may be lost to Arctic terns across all three developments. The relatively small area lost and its temporary nature as birds on passage will move on to other suitable foraging locations means that it is not predicted that any adverse effects will occur on passage Arctic terns.</li> </ul>				SPA	Neart na Gaoithe	Inch Cape	Firth of Forth	CIA (sum of three developments)	<b>Farne Islands</b>					<b>Arctic tern</b>					Autumn passage	0.6%	0.2%	2.6%	3.4%	<b>Guillemot</b>					Attend-colony period	<0.1%	<0.1%	<0.1%	<0.3%	Chicks-on-sea period	<0.1%	0.4%	0.7%	<1.2%	Post-breeding period	0.8%	0.2%	0.3%	1.3%	Winter period	0.1%	0.2%	0.7%	1.1%	<b>Puffin</b>					Attend-colony period	0.2%	0.3%	1.0%	1.5%	Post-breeding period	0.3%	0.6%	1.3%	2.1%	Winter period	<0.1%	0.4%	0.3%	<0.8%
SPA	Neart na Gaoithe	Inch Cape	Firth of Forth	CIA (sum of three developments)																																																																	
<b>Farne Islands</b>																																																																					
<b>Arctic tern</b>																																																																					
Autumn passage	0.6%	0.2%	2.6%	3.4%																																																																	
<b>Guillemot</b>																																																																					
Attend-colony period	<0.1%	<0.1%	<0.1%	<0.3%																																																																	
Chicks-on-sea period	<0.1%	0.4%	0.7%	<1.2%																																																																	
Post-breeding period	0.8%	0.2%	0.3%	1.3%																																																																	
Winter period	0.1%	0.2%	0.7%	1.1%																																																																	
<b>Puffin</b>																																																																					
Attend-colony period	0.2%	0.3%	1.0%	1.5%																																																																	
Post-breeding period	0.3%	0.6%	1.3%	2.1%																																																																	
Winter period	<0.1%	0.4%	0.3%	<0.8%																																																																	

Effect arising from project	Predicted impact and assessment of likely significant effect												
	<ul style="list-style-type: none"> <li>● Guillemot: The highest level of displacement is predicted to occur during the colony attendance period, when it is predicted that there will be a reduction in access to resources of up to 1.2% for guillemots from Farne Islands SPA from all three proposed offshore wind farms. The potential loss of access to foraging resources of up to 1.2% is relatively high but displaced birds will be able to forage elsewhere and it is predicted that there will not be an adverse effect on guillemots from potential displacement impacts.</li> <li>● Puffin: During the breeding season up to 1.5% of the foraging habitat for puffins from the Farne Islands SPA may be lost in-combination with other proposed developments. This increases to 2.1% during the post-breeding period and 0.8% during the winter. The relatively small effect upon no more than 2.1% of foraging habitat suggests that there will be no adverse effect.</li> </ul> <p><b>In-combination – Barrier effect</b></p> <ul style="list-style-type: none"> <li>● Arctic tern: Due to the distance the SPA is from the proposed developments no in-combination barrier effects are predicted to occur with either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> <li>● Guillemot: Due to the distance the SPA is from the proposed developments no in-combination barrier effects are predicted to occur with either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> <li>● Puffin: Due to the distance the SPA is from the proposed developments no in-combination barrier effects are predicted to occur with either Inch Cape or Firth of Forth Round 3 Zone Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> <li>● Kittiwake: Due to the distance the SPA is from the proposed developments no in-combination barrier effects are predicted to occur with either Inch Cape or Forth Array Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> </ul> <p><b>In-combination – Collision risk</b></p> <ul style="list-style-type: none"> <li>● Arctic tern: Less than one Arctic tern per year is predicted to collide with the proposed Neart na Gaoithe Offshore Wind Farm. Although data to undertake cumulative collision risk modelling are not available it is predicted that the potential for collision risk at other proposed offshore wind farms is low due to the low number of birds flying at rotor height.</li> <li>● Guillemot: Predicted number of impacts very low due to very low risk of collision and no adverse in-combination affects predicted.</li> <li>● Puffin: Predicted number of impacts very low due to very low risk of collision and no adverse in-combination affects predicted.</li> <li>● Kittiwake: Due to the distance the SPA is from the proposed developments no in-combination collision impacts are predicted to occur with either Inch Cape or Forth Array Offshore Wind Farms. Therefore no in-combination adverse effects are predicted.</li> </ul>												
<p><b>Conclusions</b></p>	<table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Potential adverse effect</th> </tr> </thead> <tbody> <tr> <td>Seabird assemblage</td> <td>See below.</td> </tr> <tr> <td>Arctic tern</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effects. No in-combination adverse effects.</td> </tr> <tr> <td>Kittiwake</td> <td>A predicted increase in baseline mortality of up to 0.6% per year is low. No adverse effects. No in-combination adverse effects.</td> </tr> <tr> <td>Guillemot</td> <td>Estimated displacement of up to ca. 0.8% of the population during the post-breeding period. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.</td> </tr> <tr> <td>Puffin</td> <td>Estimated displacement of up to 1.6% of the population during the post-breeding periods respectively. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.</td> </tr> </tbody> </table>	Qualifying feature	Potential adverse effect	Seabird assemblage	See below.	Arctic tern	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effects. No in-combination adverse effects.	Kittiwake	A predicted increase in baseline mortality of up to 0.6% per year is low. No adverse effects. No in-combination adverse effects.	Guillemot	Estimated displacement of up to ca. 0.8% of the population during the post-breeding period. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.	Puffin	Estimated displacement of up to 1.6% of the population during the post-breeding periods respectively. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.
Qualifying feature	Potential adverse effect												
Seabird assemblage	See below.												
Arctic tern	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effects. No in-combination adverse effects.												
Kittiwake	A predicted increase in baseline mortality of up to 0.6% per year is low. No adverse effects. No in-combination adverse effects.												
Guillemot	Estimated displacement of up to ca. 0.8% of the population during the post-breeding period. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.												
Puffin	Estimated displacement of up to 1.6% of the population during the post-breeding periods respectively. Displaced birds will be able to forage elsewhere and no adverse effects are predicted. No adverse effects. No in-combination adverse effects.												

**Box 1.13 Copinsay SPA**
*Site Information*

Topic	Information					
<b>Qualifying features of site and possible connectivity</b>  SPA is 297 km north of the offshore site	<b>Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i>, 2012)</b>	<b>Site total at designation</b>	<b>Last assessed condition</b>	<b>Possible connectivity in breeding period</b>	<b>Possible connectivity in non-breeding period</b>	<b>Reason</b>
	Seabird assemblage, breeding	70,000 i	Unfavourable Declining			
	Fulmar, breeding *400 km	1,615 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	Great black-backed gull, breeding* < 10 km <sup>1</sup>	490 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site only in non-breeding period.
	Kittiwake, breeding * 60.0 km	9,550 p	Unfavourable Recovering	No	Yes	
Guillemot, breeding * 84.2 km	29,450 i	Unfavourable Declining	No	Yes		
*species qualifies as a seabird assemblage component only. ** SPA review -population figure. p = pairs. 1						
<p>Data from the 2 years of baseline surveys indicate all of the qualifying species at Copinsay SPA are recorded regularly at the offshore site (with buffer) throughout the year. However, with the exception of fulmar the mean maximum foraging ranges during the breeding season of qualifying species is greatly exceeded by the distance between the SPA and the proposed offshore site; a distance of 297 km. Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the Copinsay SPA that could be plausibly affected during the breeding season by the proposed development.</p> <p>During the non-breeding part of the year the qualifying seabird species at Copinsay SPA range very widely in the North Sea and beyond. Therefore, it is possible that some individuals may occur at times in the offshore site. However, considering the distance to the offshore site, the huge extent of the potential winter ranges of these birds, the large number of birds from other breeding colonies and the relatively small numbers of these species that are present in the offshore site in the non-breeding period, it is likely that the number of individuals of the Copinsay populations that could be affected by the proposed development are negligible.</p> <p>Therefore, it is not likely that that the proposed development could have a significant adverse effect on these populations during the non-breeding period and so are not considered further.</p>						
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying populations at the Copinsay SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2, and using Connectivity Scenario 3 for other periods of the year.</p> <p><b>Fulmar</b></p> <p>Under Connectivity Scenario 2 it is estimated that up to approximately 0.8% of the fulmars present in the offshore site during the breeding season may be from the Copinsay SPA population. In the non-breeding period, Connectivity Scenario 3 estimates that 0.3% of fulmars present in the offshore site may be from the Copinsay SPA population.</p> <p>On the above basis, it is estimated that on average up to 0.02% (&lt;1 bird) and &lt;0.01% (&lt;1 bird) of the at-sea population of fulmars from Copinsay SPA may be present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively.</p> <p><b>Other species</b></p> <p>In the winter period, although some individuals from the great black-backed gull, kittiwake and guillemot populations breeding at the Copinsay SPA could forage in the offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for these species at this time. It is concluded that the very low connectivity expected in the winter between these Copinsay SPA populations and the offshore site means that it is likely to be of negligible value as a foraging site for them.</p>					

Topic	Information								
	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				
	Species/qualifying feature	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)
	Fulmar	0.76%	NA	NA	0.28%	0.02%, (<1)	NA	NA *	<0.01%, (<1)
	All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
	*The numbers in parentheses are the estimated number of individuals present rounded to the nearest whole number								
Conservation objectives of site	<p>The conservation objectives for Copinsay SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>								

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	There is a paucity of information of how fulmars respond to offshore wind farms. Therefore, for assessment purposes, a worst-case scenario is assumed that all fulmars may be displaced. Were fulmars to be completely displaced from the offshore site buffered to 1 km this would represent a potential loss of up to 0.02% of the feeding resources used by the Copinsay SPA population during the breeding season and 0.09% during the non-breeding period. Impacts of such small magnitude are not likely to be significant effects.
Barrier Effect	The large distance (297 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is not predicted that the proposed development will present a significant barrier effect to foraging birds from the Copinsay SPA.
Collision Mortality	No CRM was conducted for flying fulmars as no birds were observed flying at rotor height during the baseline surveys. Based on this evidence, it is predicted that no fulmars from Copinsay population will be killed. It is concluded that the effect of collision mortality from the proposed development will not affect the Favourable Conservation Status of fulmars breeding at the Copinsay SPA. Furthermore the large distance (297 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year means that it is predicted that the proposed development will not cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.
In-Combination Effects	Birds from Copinsay may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 60 km from the SPA. Collision risk modelling for the Beatrice Offshore Wind Farm predicts that for fulmar <0.01% of the population will be impacted. This increase in mortality is predicted not to have an in-combination effect with the proposed Neart na Gaoithe (BOWF, 2012). Displacement impacts from the proposed Beatrice Offshore Wind Farm are predicted to affect less than 0.6% of any of the qualifying species' populations.

Effect arising from project	Predicted impact and assessment of likely significant effect	
Conclusions	Qualifying feature	Potential adverse effect
	Seabird assemblage, breeding	See below
	Fulmar	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Great black-backed gull	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Kittiwake	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
Guillemot	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	

**Box 1.14 Calf of Eday SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 333 km north of Neart na Gaoithe	<b>Seabird assemblage, breeding</b>	30,000 i	Unfavourable Declining			
	<b>Cormorant</b> <b>12 km</b>	223 p	Favourable Maintained	No	No	Offshore site beyond mean maximum foraging distance of SPA. Species was not recorded in the offshore site.
	<b>Fulmar, breeding</b> <b>400 km</b>	1,955 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	<b>Great black-backed gull, breeding*</b> <b>&lt;10 km1</b>	938 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	<b>Kittiwake, breeding</b> <b>60.0 km</b>	1,717 p	Unfavourable Unchanged	No	Yes	Offshore site beyond mean maximum foraging distance. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	<b>Guillemot, breeding</b> <b>84.2 km</b>	12,645 p	Unfavourable Unchanged	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Data from the 2 years of baseline surveys indicate all of the qualifying species at the Calf of Eday SPA occur in the proposed development.  With exception of fulmar, the mean maximum foraging ranges of qualifying species is greatly exceeded by the distance between the SPA and the offshore site which is a distance of approximately 333 km. Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the Calf of Eday SPA that could plausibly be affected during the breeding season by the proposed development.  During the non-breeding part of the year the qualifying seabird species at Calf of Eday SPA range very widely in the North Sea and beyond. Considering the distance to the offshore site, the great extent of the potential winter ranges of these birds, the large number of birds from other breeding sites and the relatively small numbers of these species typically present in the offshore site in the non-breeding period, it is likely that the number of individuals of the Calf of Eday SPA populations that could be affected by the proposed development is negligible.					
<b>Importance of site to connected species</b>	The importance of the offshore site for foraging for qualifying species at Calf of Eday SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2, and using Connectivity Scenario 3 for other periods of the year.  <b>Fulmar</b> During the breeding season under Connectivity Scenario 2 it is estimated that 0.8% of the foraging area for fulmars from the Calf of Eday SPA population may be lost either during the breeding or non-breeding periods. On the above basis, it is estimated that ,0.1% (<1 bird) of the at-sea population of Calf of Eday SPA fulmar was present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively.  <b>Great black-backed gull, kittiwake and guillemot</b> In the winter period, although some individuals from the great black-backed gull, kittiwake and guillemot populations breeding at the Calf of Eday SPA could theoretically forage in the offshore site, the proportion of the population					

Topic	Information																																			
	<p>present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for these species at this time. It is concluded that the very low connectivity expected in the winter between these Calf of Eday SPA populations and the offshore site mean that it is likely to be of negligible value as a foraging site for these species.</p> <table border="1"> <thead> <tr> <th rowspan="2">Species/qualifying feature</th> <th colspan="4">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td>Fulmar</td> <td>0.8%</td> <td>NA</td> <td>NA</td> <td>0.3%</td> <td>&lt;0.1%, (&lt;1)</td> <td>NA</td> <td>NA *</td> <td>&lt;0.1%, (&lt;1)</td> </tr> <tr> <td>All other species</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Fulmar	0.8%	NA	NA	0.3%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)	All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																															
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																												
Fulmar	0.8%	NA	NA	0.3%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)																												
All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible																												
Conservation objectives of site	<p>The conservation objectives for Calf of Eday SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																			

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	The displacement assessment predicts <0.1% of the foraging habitat may be lost for fulmars from the Calf of Eday either during the breeding or non-breeding periods. Impacts of such small magnitude are not likely to be significant effects.
Barrier Effect	The large distance (333 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season mean that it is predicted that the proposed development will not cause a significant barrier effect to birds from the Calf of Eday SPA.
Collision Mortality	No CRM was conducted for flying fulmars as no birds were observed flying at rotor height on baseline surveys. Based on this evidence, it is predicted that no fulmars from the Calf of Eday population will be killed. It is concluded that the effect of collision mortality from the proposed development could not affect the Favourable Conservation Status of fulmars breeding at the SPA. Furthermore the large distance (333 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year mean that it is predicted that the proposed development will not cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.
In-Combination Effects	<p>The distance the SPA is from Inch cape and Firth of Forth Round 3 Zone is such that it is predicted that there will be no in-combination effect on fulmars from the Calf of Eday.</p> <p>Birds from the Calf of Eday may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 57 km from the SPA (BOWF, 2012).</p> <p>Collision risk modelling for the Beatrice Offshore Wind Farm predicts that for fulmar &lt;0.01% of the population will be impacted (BOWF, 2012).</p> <p>This increase in mortality is predicted not to have an in-combination effect with the proposed Neart na Gaoithe.</p> <p>Of those species potentially affected by displacement during the breeding season only fulmar has potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 0.1% of the Calf of Eday SPA populations. No adverse in-combination impacts are therefore predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect	
<b>Conclusions</b>	Qualifying feature	Potential adverse effect
	<b>Seabird assemblage, breeding</b>	See below.
	<b>Fulmar, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Great black-backed gull, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Kittiwake, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Guillemot, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Cormorant, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.

**Box 1 15. Hoy SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 301 km north of the offshore site	Seabird assemblage, breeding	120,000 i	Favourable Maintained			
	Red-throated diver 9 km	58 t	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Possible collision risk on migration.
	Fulmar, breeding * 400 km	35,000 p	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	Arctic skua* 62.5 km	59 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Possible collision risk on migration
	Great skua, breeding 10.9 km	1,900 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Possible collision risk on migration
	Great black-backed gull, breeding* <10 km	570 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Kittiwake, breeding * 60.0 km	3,000 p	Unfavourably Declining	No	Yes	Offshore site beyond mean maximum foraging distance. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Guillemot, breeding * 84.2 km	13,400 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Puffin, breeding* 105.4 km	3,500 p	Unfavourably Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.

Data from the 2 years of baseline surveys indicate all of the qualifying species at the Hoy SPA occur in the proposed development, though Arctic skua, great skua and red-throated diver were only recorded in very small numbers and not during the breeding season.

With exception of fulmar, the mean maximum foraging ranges of qualifying species is greatly exceeded by the distance between the SPA and the offshore site which is a distance of approximately 301 km. Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the Hoy SPA that could plausibly be affected during the breeding season by the proposed development.

During the non-breeding part of the year the qualifying seabird species at Hoy SPA range very widely in the North Sea and beyond. Considering the distance to the offshore site, the great extent of the potential winter ranges of these birds, the large number of birds from other breeding sites and the relatively small numbers of these species typically present in the offshore site in the non-breeding period, it is likely that the number of individuals of the Hoy SPA populations that could be affected by the proposed development is negligible.

Topic	Information																																			
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species at Hoy SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2, and using Connectivity Scenario 3 for other periods of the year.</p> <p><b>Fulmar</b></p> <p>During the breeding season under Connectivity Scenario 2 it is estimated that up to approximately 16% of fulmars present in the offshore site may be from the Hoy SPA population. In the non-breeding part of the year, Connectivity Scenario 3 estimates that 6.0% of the fulmars present in the offshore site are from the Hoy SPA population.</p> <p>On the above basis, it is estimated that on average up to 0.02% (7 birds) and &lt;0.01% (3 birds) of the at-sea population of Hoy SPA fulmar were present in the offshore site, buffered to 1 km, during the breeding season and non-breeding period respectively.</p> <p><b>Red-throated diver, Arctic skua and great skua</b></p> <p>The potential effects on red-throated diver, great skua and Arctic skua from the Hoy SPA populations when migrating are assessed assuming Connectivity Scenario 4. This assumes that all individuals in the population fly through the proposed wind farm twice each year, and therefore conclusions must be cautious. The proportion of the Hoy SPA red-throated diver, great skua and Arctic skua populations that actually migrate through the offshore site is unknown, although baseline surveys recorded very low numbers of these species,</p> <p><b>Other species</b></p> <p>In the winter period, although some individuals from the great black-backed gull, kittiwake, guillemot and puffin populations breeding at the Hoy SPA could theoretically forage in the offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for these species at this time. It is concluded that the very low connectivity expected in the winter between these Hoy SPA populations and the offshore site means that it is likely to be of negligible value as a foraging site for these species.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #800040; color: white;"> <th rowspan="3" style="background-color: #800040; color: white;">Species/qualifying feature</th> <th colspan="4" style="background-color: #800040; color: white;">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4" style="background-color: #800040; color: white;">Birds from SPA assumed to be in the offshore site</th> </tr> <tr style="background-color: #800040; color: white;"> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td style="background-color: #800040; color: white;"><b>Fulmar</b></td> <td style="background-color: #800040; color: white;">16.2%</td> <td style="background-color: #800040; color: white;">NA</td> <td style="background-color: #800040; color: white;">NA</td> <td style="background-color: #800040; color: white;">6.0%</td> <td style="background-color: #800040; color: white;">0.02%, (7)</td> <td style="background-color: #800040; color: white;">NA</td> <td style="background-color: #800040; color: white;">NA *</td> <td style="background-color: #800040; color: white;">&lt;0.01%, (3)</td> </tr> <tr> <td style="background-color: #800040; color: white;"><b>All other species</b></td> <td style="background-color: #800040; color: white;">None</td> <td style="background-color: #800040; color: white;">NA/negligible</td> <td style="background-color: #800040; color: white;">NA/negligible</td> <td style="background-color: #800040; color: white;">NA/negligible</td> <td style="background-color: #800040; color: white;">None</td> <td style="background-color: #800040; color: white;">NA/negligible</td> <td style="background-color: #800040; color: white;">NA/negligible</td> <td style="background-color: #800040; color: white;">NA/negligible</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	<b>Fulmar</b>	16.2%	NA	NA	6.0%	0.02%, (7)	NA	NA *	<0.01%, (3)	<b>All other species</b>	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																															
	Colony-attendance period (CS2)		Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																											
	<b>Fulmar</b>	16.2%	NA	NA	6.0%	0.02%, (7)	NA	NA *	<0.01%, (3)																											
<b>All other species</b>	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible																												
<b>Conservation objectives of site</b>	<p>The conservation objectives for Hoy SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to affect adversely these stated conservation objectives by causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																			

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of likely significant effect
<b>Displacement and Disturbance</b>	There is a paucity of information as to how fulmars respond to offshore wind farms therefore, for assessment purposes a worst-case scenario of all fulmars being displaced is assumed. Were this to occur, it would represent a potential loss of up to 0.02% of the feeding resources used by the Hoy population during the breeding season, and 0.09% during the non-breeding period. Impacts of such small magnitude are not likely to have significant or adverse effects.
<b>Barrier Effect</b>	The large distance (301 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season mean that it is predicted that the proposed development will not cause a significant barrier effect to birds from the Hoy SPA.
<b>Collision Mortality</b>	No CRM was conducted for flying fulmars as no birds were observed flying at rotor height on baseline surveys. It is predicted that no fulmars from the Hoy population will be killed. It is concluded that the effect of collision mortality from the proposed development could not affect the Favourable Conservation Status of fulmars breeding at the Hoy SPA. Furthermore the large distance (301 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year mean that it is predicted that the proposed development will not cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying

Effect arising from project	Predicted impact and assessment of likely significant effect																				
	<p>species.</p> <p>Red-throated divers fly predominately below turbine height and relatively few sightings of red-throated diver were made during site-specific surveys. This, along with the distance that the SPA is from Neart na Gaoithe, makes the risk of any impact very low and no likely significant or adverse effects are predicted to occur.</p> <p>Assuming Connectivity Scenario 4 and using a 98% avoidance rate, it is estimated that between zero and one Arctic skua from the Hoy population might be killed annually.</p> <p>Assuming Connectivity Scenario 4 and using a 98% avoidance rate, it is estimated that between zero and one great skua from the Hoy population might be killed annually.</p> <p>Connectivity Scenario 4 is considered to be close to a worst-case scenario for red-throated diver, Arctic skua and great skua as it is very unlikely that all the Hoy population of these species would pass through the wind farm on migration (a width of approximately 10 km). It is much more likely that birds from these populations would pass through a broader zone extending from the Fife coast eastwards to beyond the offshore site, a width of at least 25 km. It is also possible that a proportion of the Hoy Arctic and great skuas migrate south down the west coast of Britain, a route that would mean there was no collision risk from the proposed development.</p>																				
<b>In-Combination Effects</b>	<p>Birds from Hoy may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 57 km from the SPA (BOWF, 2012).</p> <p>Collision risk modelling for the Beatrice Offshore Wind Farm predicts that for fulmar, kittiwake, guillemot and puffin &lt;0.01% of the population will be impacted. For great skua this increases to 0.3% of the population and for great black-backed gull this increases to 0.7%. There is a potential collision risk impact of 5.1% of the Arctic skua population from Hoy (BOWF 2012).</p> <p>This increase in mortality is not predicted to have an in-combination effect with the proposed Neart na Gaoithe.</p> <p>Of those species potentially affected by displacement during the breeding season only fulmar has potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 0.3% of the Hoy SPA populations and therefore no adverse in-combination impacts are predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm.</p>																				
<b>Conclusions</b>	<table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Potential adverse effect</th> </tr> </thead> <tbody> <tr> <td><b>Seabird assemblage, breeding</b></td> <td>See below.</td> </tr> <tr> <td><b>Red-throated diver</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Fulmar, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Arctic skua</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Great skua, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Great black-backed gull, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Kittiwake, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Guillemot, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> <tr> <td><b>Puffin, breeding</b></td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.</td> </tr> </tbody> </table>	Qualifying feature	Potential adverse effect	<b>Seabird assemblage, breeding</b>	See below.	<b>Red-throated diver</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Fulmar, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Arctic skua</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Great skua, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Great black-backed gull, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Kittiwake, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Guillemot, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.	<b>Puffin, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
Qualifying feature	Potential adverse effect																				
<b>Seabird assemblage, breeding</b>	See below.																				
<b>Red-throated diver</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Fulmar, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Arctic skua</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Great skua, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Great black-backed gull, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Kittiwake, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Guillemot, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				
<b>Puffin, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.																				

**Box 1.16 Rousay SPA**

*Site Information*

Topic	Information					
<b>Qualifying features of site and possible connectivity</b>  SPA is 337 km north of Neart na Gaoithe	Qualifying Feature and mean maximum foraging distance (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
	Seabird assemblage, breeding	>20,000 i	Favourable Maintained			
	Fulmar, breeding 400 km	1,240 p	Unfavourable Declining	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	Arctic skua* 62.5 km	130 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Possible collision risk on migration
	Kittiwake, breeding 60.0 km	4,900 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Guillemot, breeding 84.2 km	10,600 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Arctic tern 105.4 km	790 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
<p>Data from the 2 years of baseline surveys indicate all of the qualifying species at the Rousay SPA occur in the proposed development.</p> <p>With exception of fulmar, the mean maximum foraging ranges of qualifying species is greatly exceeded by the distance between the SPA and the offshore site; a distance of approximately 337 km. Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the Rousay SPA that could plausibly be affected during the breeding season by the proposed development.</p> <p>During the non-breeding part of the year the qualifying seabird species at Rousay SPA range very widely in the North Sea and beyond. Considering the distance to the offshore site, the huge extent of the potential winter ranges of these birds, the large number of birds from other breeding sites and the relatively small numbers of these species typically present in the offshore site in the non-breeding period, it is likely that the number of individuals of the Rousay SPA populations that could be affected by the proposed development is negligible.</p>						
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species at Rousay SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2. Connectivity Scenario 3 is used for other periods of the year.</p> <p><b>Fulmar</b></p> <p>During the breeding season under Connectivity Scenario 2 it is estimated that up to approximately 0.6% of fulmars present in the offshore site may be from the Rousay SPA population. In the non-breeding part of the year, Connectivity Scenario 3 estimates that 0.3% of the fulmars present in the offshore site are from the Rousay SPA population.</p> <p>On the above basis, it is estimated that on average &lt;0.1% (&lt;1 birds) of the at-sea population of Rousay SPA fulmars were present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively.</p> <p><b>Other species</b></p> <p>In the winter period, although some individuals from the populations breeding at the Rousay SPA could theoretically forage in the proposed offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for these species at this time. It is concluded that the very low connectivity expected in the winter between these Rousay SPA populations and the offshore site means that it is likely to be of negligible value as a foraging site for these species.</p>					

Topic	Information																																			
	<table border="1"> <thead> <tr> <th rowspan="2">Species/qualifying feature</th> <th colspan="4">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td>Fulmar</td> <td>0.6%</td> <td>NA</td> <td>NA</td> <td>0.3%</td> <td>&lt;0.1%, (&lt;1)</td> <td>NA</td> <td>NA *</td> <td>&lt;0.1%, (&lt;1)</td> </tr> <tr> <td>All other species</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Fulmar	0.6%	NA	NA	0.3%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)	All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																															
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																												
Fulmar	0.6%	NA	NA	0.3%	<0.1%, (<1)	NA	NA *	<0.1%, (<1)																												
All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible																												
Conservation objectives of site	<p>The conservation objectives for Rousay SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to affect adversely these stated conservation objectives by causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																			

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	There is a paucity of information of how fulmars respond to offshore wind farms therefore, for assessment purposes a worst-case scenario is assumed that all fulmars would be displaced. Were this to occur, it would represent a potential loss of up to 0.1% of the feeding resources used by the Rousay population. Impacts of such small magnitude are not likely to be significant effects.
Barrier Effect	The large distance (337 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is predicted that the proposed development will not cause a significant barrier effect to birds from the Rousay SPA.
Collision Mortality	No CRM was conducted for flying fulmars as no birds were observed flying at rotor height on baseline surveys. Based on this evidence, it is predicted that no fulmars from the Rousay population will be killed. It is concluded that the effect of collision mortality from the proposed development could not affect the Favourable Conservation Status of fulmars breeding at the Rousay SPA. Furthermore the large distance (337 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year means that it is predicted that the proposed development will not cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.
In-Combination Effects	<p>Birds from Rousay may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 94 km from the SPA (BOWF, 2012).</p> <p>Collision risk modelling for the Beatrice Offshore Wind Farm predicts that for fulmar &lt;0.01% of the population will be impacted (BOWF, 2012).</p> <p>This increase in mortality is predicted not have an in-combination effect with the proposed Neart na Gaoithe.</p> <p>Of those species potentially affected by displacement during the breeding season only fulmar has the potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 0.1% of the Rousay SPA populations and therefore no adverse in-combination impacts are predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm but the potential in-combination impacts are predicted to be negligible.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect	
<b>Conclusions</b>	Qualifying feature	Potential adverse effect
	<b>Seabird assemblage, breeding</b>	See below.
	<b>Fulmar, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Arctic skua</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Kittiwake, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Guillemot, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Arctic tern</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.

**Box 1.17 North Caithness Cliffs SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 275 km north of Neart na Gaoithe	<b>Seabird assemblage, breeding</b>	110,000 i	Favourable Maintained			
	<b>Fulmar, breeding *</b> 400 km	14,700	Favourable Maintained	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	<b>Kittiwake, breeding *</b> 60.0 km	13,100 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	<b>Guillemot, breeding</b> 84.2 km	38,300 i	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	<b>Razorbill, breeding *</b> 48.5 km	4,000 i	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	<b>Puffin, breeding*</b> 105.4 km	1,750 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
<p>*species qualifies as a seabird assemblage component only. ** SPA review -population figure. p = pairs.</p> <p>Data from the 2 years of baseline surveys indicate that all of the qualifying species at the North Caithness Cliffs SPA occur in the offshore site.</p> <p>However, with the exception of fulmar, the mean maximum foraging ranges during the breeding season of qualifying species is greatly exceeded by the distance between the SPA and the offshore site; a distance of 275 km. Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the North Caithness Cliffs SPA that could be potentially affected during the breeding season by the proposed development.</p> <p>During the non-breeding part of the year the qualifying seabird species at North Caithness Cliffs SPA all range very widely in the North Sea and beyond. Therefore, it is possible that some individuals from this SPA occur in the proposed development site at this time of year. However, considering the distance to the offshore site, the huge extent of the potential winter ranges of these birds, the large number of birds from other breeding sites and the relatively small numbers of these species that are present in the offshore site in the non-breeding period, it is likely that the number of individuals of the North Caithness Cliffs SPA populations that could be affected by the proposed development are negligible. Therefore, it is predicted that the proposed development will not have a significant adverse effect on these populations during the non-breeding period and so are not considered further.</p>						
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species at the North Caithness Cliffs SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2. Connectivity Scenario 3 is used for other periods of the year.</p> <p><b>Fulmar</b></p> <p>Connectivity Scenario 2 estimates that the only qualifying feature population that is likely to forage in the offshore site during the breeding season is fulmar. It is estimated that up to approximately 7.4% of the fulmars present in the offshore site during the breeding season are from the North Caithness Cliffs SPA population. This is likely to be an overestimate because feeding trips at the upper end of the mean maximum foraging range are most likely to be to areas well offshore, rather than relatively inshore areas closer to other breeding colonies such as the offshore site. In the non-breeding part of the year, Connectivity Scenario 3 estimates that 2.5% of the fulmars present in the offshore site are from the North Caithness Cliffs SPA population.</p> <p>On the above basis, it is estimated that on average 0.02% (~3 birds) &lt;0.01% (~1 bird) of the at-sea North Caithness SPA fulmar population were present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively. These percentages give an indication of the absolute importance of this area for foraging fulmars from the North Caithness Cliffs SPA population.</p>					

	<p><b>Other species</b></p> <p>In the non-breeding period, although some individuals from the kittiwake, guillemot, razorbill and puffin populations breeding at the North Caithness Cliffs SPA could theoretically forage in the offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for these species at this time of year. It is concluded that the very low connectivity expected in the non-breeding period between these North Caithness Cliffs SPA populations and the offshore site means that it is likely to be of negligible value as a foraging site for birds from these populations.</p> <table border="1"> <thead> <tr> <th rowspan="2">Species/Qualifying feature</th> <th colspan="4">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4">Birds from SPA assumed to be in the offshore site</th> </tr> <tr> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> <th>Colony-attendance period (CS2)</th> <th>Chicks-at-sea period (CS3)</th> <th>Post-breeding period (CS3)</th> <th>Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td>Fulmar</td> <td>7.5%</td> <td>NA</td> <td>NA</td> <td>2.4%</td> <td>0.02%, (3)</td> <td>NA</td> <td>NA *</td> <td>&lt;0.01%, (1)</td> </tr> <tr> <td>All other species</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest whole number.</p>	Species/Qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Fulmar	7.5%	NA	NA	2.4%	0.02%, (3)	NA	NA *	<0.01%, (1)	All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
Species/Qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																															
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																												
Fulmar	7.5%	NA	NA	2.4%	0.02%, (3)	NA	NA *	<0.01%, (1)																												
All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible																												
<p><b>Conservation objectives of site</b></p>	<p>The conservation objectives for North Caithness Cliffs SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																			

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
<p><b>Displacement and Disturbance</b></p>	<p>There is a paucity of information of how fulmars respond to offshore wind farms therefore, for assessment purposes a worst-case scenario is assumed that all fulmars may be displaced. Were this to occur, this would represent a potential loss of up to 0.02% of the feeding habitat used by the North Caithness SPA population during the breeding season, and up to &lt;0.01% during the non-breeding period. Impacts of such small magnitude are not likely to cause significant effects.</p>
<p><b>Barrier Effect</b></p>	<p>The large distance (275 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is not likely that the proposed development could present a significant barrier effect to foraging birds from the North Caithness SPA.</p>
<p><b>Collision Mortality</b></p>	<p>No CRM was conducted for flying fulmars as no birds were observed flying at rotor height on baseline surveys. It is predicted that no birds from the North Caithness Cliffs population would be killed. It is concluded that the effect of collision mortality from the proposed development is not likely to be a significant effect and is therefore unlikely to affect the Favourable Conservation Status of fulmars breeding at the North Caithness Cliffs SPA.</p> <p>Furthermore, the large distance (275 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year means that it is not likely that the proposed development could cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.</p>
<p><b>In-Combination Effects</b></p>	<p>Birds from North Caithness Cliffs may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 29 km from the SPA (BOWF, 2012).</p> <p>Collision risk modelling for the Beatrice Offshore Wind Farm predicts that for fulmar, kittiwake, guillemot, razorbill and puffin &lt;0.04% of the SPA population might be impacted (BOWF, 2012).</p> <p>This increase in potential mortality is predicted not have an in-combination effect with the proposed Neart na Gaoithe (BOWF, 2012).</p> <p>Of those species potentially affected by displacement during the breeding season only fulmar has potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 1.3% of the North Caithness Cliffs SPA populations and therefore no adverse in-combination impacts are predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm.</p>

Effect arising from project	Predicted impact and assessment of likely significant effect	
Conclusions	Qualifying feature	Potential adverse effect
	Seabird assemblage, breeding	See below.
	Fulmar, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Kittiwake, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Guillemot, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Razorbill, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Puffin, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.

**Box 1.18 East Caithness Cliffs SPA**

*Site Information*

Topic	Information					
	Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
<b>Qualifying features of site and possible connectivity</b>  SPA is 260 km north of Neart na Gaoithe	Seabird assemblage, breeding	300,000 i	Favourable Maintained	Yes	Yes	
	Fulmar, breeding * 400 km	15,000 p	Favourable Maintained	No	No	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site at all times of year.
	Cormorant, breeding * 25 km	230 p	Unfavourable Declining	No	No	Offshore site beyond mean maximum foraging range of SPA. Not recorded in offshore site on baseline surveys.
	Shag, breeding 14.5 km	2,300 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging range of SPA. Not recorded in offshore site on baseline surveys.
	Herring gull, breeding 61.1 km	9,400 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Great black-backed gull, breeding* <10 km	800 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Kittiwake, breeding 60.0 km	32,500 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Guillemot, breeding 84.2 km	106,700 i	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Razorbill, breeding 48.5 km	15,800 i	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
	Puffin, breeding* 105.4 km	1,750 p	Favourable Maintained	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.

\*species qualifies as a seabird assemblage component only. \*\* SPA review -population figure. p = pairs. 1 Thaxter *et al.*, 2012.

Data from the 2 years of baseline surveys indicate all of the qualifying species at East Caithness Cliffs SPA except shag and cormorant occur in the offshore site. However, with the exception of fulmar the mean maximum foraging ranges of qualifying species is greatly exceeded by the distance between the SPA and the offshore site (260 km). Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at East Caithness Cliffs SPA that could plausibly be affected by the proposed development during the breeding season.

During the non-breeding period the qualifying seabird species at East Caithness Cliffs SPA all range very widely in the North Sea and beyond, with the exception of shag and cormorant which remain in coastal waters. Therefore, with the

Topic	Information																																			
	<p>exception of shag and cormorant, it is possible that some individuals from this SPA occur in the offshore site at this time. However, considering the distance between the SPA and the offshore site, the great extent of the potential winter ranges of these birds, the large number of birds from other breeding sites and the relatively small numbers of these species that are present in the offshore site in the non-breeding period, it is likely that the number of individuals of the East Caithness Cliffs SPA populations that could be affected by the proposed development is negligible. Therefore, it is not likely that that the proposed development could have a significant adverse effect on these populations during the non-breeding period and so these impacts are not considered further.</p>																																			
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species at East Caithness Cliffs SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2. Connectivity Scenario 3 is used for other periods of the year.</p> <p><b>Fulmar</b></p> <p>Under Connectivity Scenario 2, it is estimated that up to approximately 8% of fulmars present in the offshore site are from the East Caithness Cliffs SPA population. This is likely to be an overestimate because feeding trips at the upper end of the foraging range are most likely to be to areas well offshore, rather than relatively inshore areas closer to other breeding colonies such as the offshore site. In the non-breeding part of the year, Connectivity Scenario 3 estimates that 2.6% of the fulmars present in the offshore site are from the East Caithness Cliffs SPA population.</p> <p>On the above basis, it is estimated that on average up to 0.02% (4 birds) and &lt;0.01% (1 bird) of the at-sea East Caithness SPA fulmar population were present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively. These percentages give an indication of the absolute importance of this area for foraging fulmars of the East Caithness Cliffs SPA population.</p> <p><b>Other species</b></p> <p>In the non-breeding period, although some individual from the herring gull, great-black-backed gull, kittiwake, guillemots, razorbill and puffin populations breeding at the East Caithness Cliffs SPA could theoretically forage in the offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for them at this time. It is concluded that the very low connectivity expected in the non-breeding period between the East Caithness Cliffs SPA populations of these species and the offshore site means that it is likely to be of negligible value as a foraging site for them.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #800040; color: white;"> <th rowspan="2" style="background-color: #800040; color: white;">Species/qualifying feature</th> <th colspan="4" style="background-color: #800040; color: white;">Birds present in offshore sites assumed to be from SPA</th> <th colspan="4" style="background-color: #800040; color: white;">Birds from SPA assumed to be in the offshore site</th> </tr> <tr style="background-color: #800040; color: white;"> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> <th style="background-color: #800040; color: white;">Colony-attendance period (CS2)</th> <th style="background-color: #800040; color: white;">Chicks-at-sea period (CS3)</th> <th style="background-color: #800040; color: white;">Post-breeding period (CS3)</th> <th style="background-color: #800040; color: white;">Winter period (CS3)</th> </tr> </thead> <tbody> <tr> <td style="background-color: #e0e0e0;"><b>Fulmar</b></td> <td>8.0%</td> <td>NA</td> <td>NA</td> <td>2.6%</td> <td>0.02%, (4)</td> <td>NA</td> <td>NA *</td> <td>&lt;0.01%, (1)</td> </tr> <tr> <td style="background-color: #e0e0e0;"><b>All other species</b></td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>None</td> <td>NA/negligible</td> <td>NA/negligible</td> <td>NA/negligible</td> </tr> </tbody> </table> <p>*The numbers in parentheses are the estimated number of individuals present rounded to the nearest whole number.</p>	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site				Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	<b>Fulmar</b>	8.0%	NA	NA	2.6%	0.02%, (4)	NA	NA *	<0.01%, (1)	<b>All other species</b>	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible
Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site																															
	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)																												
<b>Fulmar</b>	8.0%	NA	NA	2.6%	0.02%, (4)	NA	NA *	<0.01%, (1)																												
<b>All other species</b>	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible	NA/negligible																												
<b>Conservation objectives of site</b>	<p>The conservation objectives for East Caithness Cliffs SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>																																			

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
<b>Displacement and Disturbance</b>	There is a paucity of information of how fulmars respond to offshore wind farms therefore, for assessment purposes, a worst-case scenario is assumed that all fulmars would be displaced. Were this to occur, this would represent a potential loss of up to 0.02% of the feeding resources used by the East Caithness Cliffs SPA population during the breeding season, and up to <0.01% during the non-breeding period.
<b>Barrier Effect</b>	The large distance (260 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is not likely that the proposed development could present a significant barrier effect to foraging birds from the East Caithness Cliffs SPA.

Effect arising from project	Predicted impact and assessment of likely significant effect																																	
<b>Collision Mortality</b>	<p>No CRM was conducted for flying fulmars as no birds were observed flying at rotor height on baseline surveys. It is predicted that no birds from the East Caithness Cliffs population would be killed. It is concluded that the effect of collision mortality is not likely to be a significant effect and is therefore unlikely to affect the Favourable Conservation Status of fulmars breeding at the East Caithness Cliffs SPA.</p> <p>Furthermore, the large distance (260 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year means that it is not likely that the proposed development could cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.</p>																																	
<b>In-Combination Effects</b>	<p>Birds from East Caithness Cliffs may also occur in the proposed Beatrice and Moray Firth Offshore Wind Farms, which lie approximately 11 km from the SPA (BOWF, 2012).</p> <p>Collision risk modelling for the Beatrice Offshore Wind Farm predict that for all but herring gull and great black-backed gull less than 1% of the SPA population is predicted to be at risk. The CRM predicts 1.1% of the herring gull population and 27.2% of great black-backed gulls might be impacted (BOWF, 2012).</p> <p>Neart na Gaoithe is beyond the maximum foraging range for both great-black backed gull and herring gull during the breeding season and therefore no in-combination effect is predicted during this period (BOWF, 2012).</p> <p>Of those species potentially affected by displacement during the breeding season only fulmar has potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 0.1% of the East Caithness Cliffs SPA populations and therefore no adverse in-combination impacts are predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm.</p>																																	
<b>Conclusions</b>	<table border="1"> <thead> <tr> <th>Qualifying feature</th> <th>Potential adverse effect</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td><b>Seabird assemblage, breeding</b></td> <td>No</td> <td>See below.</td> </tr> <tr> <td><b>Fulmar, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Cormorant, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Shag, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Herring gull, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Great black-backed gull, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Kittiwake, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Guillemot, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Razorbill, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> <tr> <td><b>Puffin, breeding</b></td> <td>No</td> <td>No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.</td> </tr> </tbody> </table> <p>It is determined that only one qualifying species, fulmar, has any likely connectivity to the offshore site during the breeding season and then not strongly. All qualifying species, except shag, potentially have some connectivity to the offshore site in the non-breeding period, but in all cases this is likely to be very weak. Nevertheless, it is determined through Step 2 that the proposed development will not have adverse effects on any qualifying feature population. It is also concluded that the proposal in combination with the two other proposed offshore wind farms in the region will have no adverse effect on any qualifying feature.</p> <p>It is up to the competent authority to draw conclusions as to whether the proposed development is likely to affect the Favourable Conservation Status of East Caithness Cliffs SPA seabird populations. Given the above conclusions it appears very unlikely the proposed development would have any detrimental effects on the Favourable Conservation Status of any qualifying features at this SPA.</p>	Qualifying feature	Potential adverse effect	Reason	<b>Seabird assemblage, breeding</b>	No	See below.	<b>Fulmar, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Cormorant, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Shag, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Herring gull, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Great black-backed gull, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Kittiwake, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Guillemot, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Razorbill, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.	<b>Puffin, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.
Qualifying feature	Potential adverse effect	Reason																																
<b>Seabird assemblage, breeding</b>	No	See below.																																
<b>Fulmar, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Cormorant, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Shag, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Herring gull, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Great black-backed gull, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Kittiwake, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Guillemot, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Razorbill, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																
<b>Puffin, breeding</b>	No	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts.																																

**Box 1.19 Troup, Pennan and Lion's Heads SPA**

*Site Information*

Topic	Information					
<b>Qualifying features of site and possible connectivity</b>  SPA is 171 km north of Neart na Gaoithe	Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding period	Possible connectivity in non-breeding period	Reason
	Seabird assemblage, breeding	150,000 i	Unfavourable Declining			
	Fulmar, breeding * 400 km	4,400 p	Unfavourable Declining	Yes	Yes	Offshore site within mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site at all times of year.
	Herring gull, breeding * 61.1 km	4,200 p	Unfavourable No change	No	No	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site in non-breeding period.
	Kittiwake, breeding * 60.0 km	31,600 p	Unfavourable No change	No	No	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site in non-breeding period.
	Guillemot, breeding 84.2 km	44,600 i	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site in non-breeding period.
	Razorbill, breeding 48.5 km	3,126 p	Unfavourable Declining	No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from this SPA potentially present in offshore site in non-breeding period.
<p>*species qualifies as a seabird assemblage component only. ** SPA review -population figure. p = pairs.</p> <p>Data from the 2 years of baseline surveys indicate all of the qualifying species that are qualifying interests at the Troup, Pennan and Lion's Heads SPA occur regularly in the offshore site. However, with the exception of fulmar the mean maximum foraging ranges of qualifying species is greatly exceeded by the distance between the SPA and the offshore site (171 km). Based on mean maximum foraging range, it is concluded that fulmar is the only qualifying species at the Troup, Pennan and Lion's Heads SPA that is likely to be affected during the breeding season by the proposed development.</p> <p>During the non-breeding part of the year the qualifying seabird species at Troup, Pennan and Lion's Heads SPA range very widely in the North Sea and beyond. Therefore, it is possible that some individuals from this SPA occur in the offshore site at this time. However, considering the distance between the SPA and the offshore site, the great extent of the potential winter ranges of these birds, the large number of birds from other breeding colonies and the relatively small numbers of these species that are present in the offshore site in the non-breeding period, it is likely that the number of individuals of the Troup, Pennan and Lion's Heads SPA populations that could be affected by the proposed development are negligible. Therefore, it is predicted that the proposed development will not have a significant adverse effect on these SPA populations during the non-breeding period and so these impacts are not considered further.</p>						
<b>Importance of site to connected species</b>	<p>The importance of the offshore site for foraging for qualifying species at the Troup, Pennan and Lion's Heads SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2 Connectivity Scenario 3 is used for other periods of the year.</p> <p>Under Connectivity Scenario 2 it is estimated that up to approximately 3.6% of fulmars present in the offshore site are from the Troup, Pennan, and Lion's Heads SPA population. This is likely to be an overestimate because foraging trips at the upper end of the foraging range are most likely to be to areas well offshore, rather than relatively inshore areas closer to other breeding colonies such as the offshore site. In the non-breeding part of the year, Connectivity Scenario 3 estimates that 0.8% of fulmars present in the offshore site are from the Troup, Pennan, and Lion's Heads SPA population.</p> <p>On the above basis, it is estimated that on average up to 0.04% (2 birds) and &lt;0.01% (&lt;1 bird) of the at-sea Troup, Pennan, and Lion's Heads SPA fulmar population were present in the offshore site buffered to 1 km during the breeding season and non-breeding period respectively. These percentages give an indication of the absolute importance of this area for foraging fulmars of the North Caithness Cliffs SPA population.</p> <p>In the winter period, although some individuals from the herring gull, kittiwake, guillemot and razorbill populations breeding at the Troup, Pennan, and Lion's Heads SPA could forage in the offshore site, the proportion of the population present is likely to be negligible (well below 1%). This is because all these species range very widely over vast areas during the winter and there is no evidence that the Firth of Forth area is especially important for them at this time. It is concluded that the very low connectivity expected in the winter between the Troup, Pennan, and Lion's Heads SPA populations of these species and the offshore site means that it is likely to be of negligible value as a foraging site for them.</p>					

Topic	Information							
	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site		
Colony-attendance period (CS2)		Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)
	Fulmar	3.6%	NA	NA	0.8%	0.04%, (2)	NA *	<0.01%, (<1)
	All other species	None	NA/negligible	NA/negligible	NA/negligible	None	NA/negligible	NA/negligible
*The numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.								
Conservation objectives of site	<p>The conservation objectives for Troup, Pennan and Lion’s Heads SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to affect adversely these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>							

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	There is a paucity of information of how fulmars respond to offshore wind farms therefore, for assessment purposes a worst-case scenario is assumed that all fulmars would be displaced. Were this to occur, this would represent a potential loss of up to 0.04% of the feeding resources used by the Troup, Pennan and Lion’s Heads SPA population during the breeding season, and up to 0.01% during the non-breeding period.
Barrier Effect	The large distance (171 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely forage in the offshore site during the breeding season means that it is not predicted that the proposed development will present a significant barrier effect to foraging birds from the Troup, Pennan and Lion’s Heads SPA.
Collision Mortality	No CRM was conducted for flying fulmars as no birds were observed flying at rotor height during baseline surveys. Based on this evidence, it follows that no birds from the Troup, Pennan and Lion’s Heads SPA population would be killed. It is concluded that the effect of collision mortality is not likely to be a significant effect and is therefore unlikely to affect the Favourable Conservation Status of fulmars breeding at the Troup, Pennan and Lion’s Heads SPA. Furthermore, the large distance (171 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore area flying at rotor height at any time of year means that it is not likely that the proposed development could cause a level of collision mortality sufficient to have a likely significant or adverse effect on the population of any qualifying species.
In-Combination Effects	Birds from Troup, Pennan, and Lion’s Heads SPA may also occur in the proposed Beatrice and Moray Firth offshore wind farms, which lie approximately 62 km from the SPA (BOWF, 2012). Collision risk modelling for the Beatrice offshore wind farm predict that for all qualifying species less than 0.06% of the population is predicted to be at risk of collision (BOWF, 2012). Of those species potentially affected by displacement during the breeding season only fulmar has potential for an in-combination effect. Displacement impacts from the proposed Beatrice Offshore Wind Farm on fulmar are predicted to affect less than 0.3% of the Troup, Pennan, and Lion’s Heads SPA populations and therefore no adverse in-combination impacts are predicted to arise from Neart na Gaoithe and the Beatrice Offshore Wind Farm. No data are available for the Moray Firth Offshore Wind Farm.

Effect arising from project	Predicted impact and assessment of likely significant effect	
Conclusions	Qualifying feature	Reason
	Seabird assemblage, breeding	See below.
	Fulmar, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Herring gull, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Kittiwake, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	Guillemot, breeding	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.

**Box 1.20 Coquet Island SPA**

*Site Information*

Topic	Information					
<b>Qualifying features of site and possible connectivity</b>  SPA is 106 km south of Neart na Gaoithe	Qualifying feature and mean maximum foraging range (Thaxter <i>et al.</i> , 2012)	Site total at designation	Last assessed condition	Possible connectivity in breeding season	Possible connectivity in non-breeding period	Reason
	Seabird assemblage, breeding	Not given	No information available			
	Black-headed gull, breeding* 25.5 km	Not given		No	Yes	Offshore site beyond maximum foraging distance of SPA. Not recorded in offshore site on baseline surveys.
	Sandwich tern, breeding 49.0 km	1,590 p		No	No	
	Roseate tern, breeding 16.6 km	31 p		No	No	
	Common tern, breeding 15.2 km	740 p		No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in autumn passage period.
	Arctic tern, breeding 24.2 km	700 p		No	Yes	Offshore site beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in autumn passage period.
	Puffin, breeding 105.4 km	11,400**		Yes	Yes	Offshore site just beyond mean maximum foraging distance of SPA. Small proportion of birds from SPA potentially present in offshore site in non-breeding period.
*species qualifies as a seabird assemblage component only. ** SPA review -population figure. p = pairs.  Data from the 2 years of baseline surveys indicate that four of the qualifying species at Coquet Island SPA do not occur in the offshore site, or occur so rarely that they could not plausibly be affected. These species are black-headed gull, Sandwich tern, roseate tern and common tern. Of the remaining two qualifying species, Arctic tern occurs in relatively large numbers in the offshore site in the autumn migration period, while puffin occurs throughout the year.  On this basis it is likely that only one of the qualifying seabirds at the Coquet Island SPA (the puffin) could occur in the offshore site during the breeding season. However, it is possible that some Arctic and common terns and puffins from the Coquet SPA populations occur in the offshore site in the non-breeding part of the year particularly in the autumn passage/post-breeding period (late summer and autumn).						
<b>Importance of site to connected species</b>	The importance of the offshore site for foraging for qualifying species at Coquet Island SPA during the colony attendance part of the breeding season is estimated using Connectivity Scenario 2. Connectivity Scenario 3 is used for other periods of the year.  The importance of the offshore site as foraging habitat for puffins of the Coquet Island SPA population during the non-breeding period of the year are assessed assuming the degree of connectivity that is estimated by Connectivity Scenario 3.  The importance of the offshore site as foraging habitat for Arctic terns of the Coquet Island SPA population during the autumn-passage period is assessed assuming the degree of connectivity that is estimated by Connectivity Scenario 3, but including all UK breeding colonies as far north as Shetland.  The large numbers of Arctic tern encountered on baseline surveys, on occasion, in the autumn passage period in the outer Firth of Forth strongly suggest that birds from beyond the Peterhead to Blyth region are passing through the area on migration. The origins of the birds present at this time of year are not known but are likely to include birds from breeding sites across eastern Scotland including Shetland, as well as Northumberland, and probably Scandinavia as well. Therefore, the assessment of Arctic tern for the autumn passage period is based on comparison against the breeding population for Shetland to Northumberland (98,052 adults, derived from Mitchell <i>et al.</i> , 2004, see Chapter 12: Ornithology).					

Topic	Information								
Importance of site to connected species (continued)	Species/qualifying feature	Birds present in offshore sites assumed to be from SPA				Birds from SPA assumed to be in the offshore site			
		Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)	Colony-attendance period (CS2)	Chicks-at-sea period (CS3)	Post-breeding period (CS3)	Winter period (CS3)
	Arctic tern	None	NA	1.4%	None	None	NA	0.17%, (3)	None
	Puffin	3.2%	NA	12.1%	12.1%	0.3% (58)	NA	0.5%, (163)	<0.1%, (4)
Note: he numbers in parentheses are the estimated number of individuals present rounded to the nearest integer.									
Conservation objectives of site	<p>The conservation objectives for Coquet Island SPA are the generic objectives for breeding seabird sites. The proposed development has the potential to adversely affect these stated conservation objectives through causing:</p> <ul style="list-style-type: none"> <li>● Significant disturbance from vessel activities and operational turbines;</li> <li>● Reduction in the extent of habitat effectively available for foraging due to displacement and/or barrier effects; and/or</li> <li>● Reduction in the viability of a population due to additional mortality caused by turbine strike, or reduced productivity caused by disturbance and/or habitat loss.</li> </ul>								

Potential Adverse Effects

Effect arising from project	Predicted impact and assessment of likely significant effect
Displacement and Disturbance	Assuming puffins show a displacement response of up to 50% displacement, it is estimated that displacement could lead to the effective loss of approximately 0.3% of foraging habitat during the breeding period and 0.5% of the foraging habitat used by puffins from the Coquet Island SPA population during the post-breeding period. This is a relatively low proportion of the SPA population that may be potentially displaced and those that are displaced are likely to relocate to other areas. Therefore it is concluded that an adverse effect on the SPA population is not likely.
Barrier Effect	The large distance (106 km) separating the offshore site from this SPA and the very small number of individuals from this SPA likely to forage in the offshore site during the breeding season means that it is not likely that the proposed development could present a significant barrier effect to birds from the Coquet Island SPA.
Collision Mortality	CRM predicts that the qualifying feature populations from Coquet Island SPA that are likely to use the offshore site (Arctic tern and puffin) will not experience any mortality from collision strike because all flight activity recorded by these species during baseline surveys was below the proposed rotor height. Furthermore the large distance (106 km) between the offshore site and this SPA and the very small number of individuals from this SPA likely to occur in the offshore site flying at rotor height at any time of year means that it is not likely that the proposed development could cause a level of collision mortality sufficient to have a discernible effect on the population of any qualifying species.
In-Combination Effects	There is potential for qualifying species from the Coquet Island SPA to be impacted with other offshore wind farms, in particular the proposed Dogger Bank Offshore Wind Farm which lies to the southeast of Coquet Island. No data are available from the proposed development in order to undertake an in-combination assessment. The cumulative total from the proposed developments in the Firth of Forth is predicted to be less than 0.4% of foraging habitat during the breeding period and up to 2.1% during the post-breeding period. This level of potential displacement is not predicted to cause a likely significant effect.

Effect arising from project	Predicted impact and assessment of likely significant effect	
<b>Conclusions</b>	Qualifying feature	Potential adverse effect
	<b>Seabird assemblage</b>	See below.
	<b>Sandwich tern, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Roseate tern, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Common tern, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Arctic tern, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Sandwich tern, breeding</b>	No adverse displacement, barrier or collision effects are predicted due to the distance the proposed development is from the breeding colony and the predicted potential impacts. No adverse effect. No in-combination adverse effect.
	<b>Puffin</b>	Low proportion of the post-breeding population may be displaced but will be able to relocate to other areas. No adverse effect. No in-combination adverse effect.

## 11.8 Impact Assessment: Special Areas of Conservation

### 11.8.1 Screening in Sites and Assessing Connectivity

67 As outlined above, a screening exercise has already been undertaken by SNH at the scoping stage of EIA/HRA to identify potential SACs with connectivity to the proposed development, along with likely significant effects.

### 11.8.2 In-Combination Effects on Screened-In SACs

68 As outlined above, other projects or plans have the potential to affect qualifying features of SACs in combination with impacts arising from Neart na Gaoithe. The plans and projects assessed as having potential to impact in combination with the Neart na Gaoithe project are those advised by SNH (2010) and in the Blue Seas - Green Energy HRA AA Information Review (Marine Scotland, 2011c) for each SAC and relevant qualifying feature.

### 11.8.3 Summary of Impacts on SACs: Information to Inform an Appropriate Assessment

69 For the purposes of Habitats Regulations Appraisal, the following section summarises the assessed impacts (LSEs) for Special Areas of Conservation and their qualifying features and forms the basis of the information to inform an AA.

70 Information on the Rochdale Envelope parameters assessed and the effects arising from the development, the pathways and receptors impacted, as well as further detail on the expected impacts and data and literature sources are provided in individual chapters; Chapter 13: Marine Mammals and Chapter 15: Fish and Shellfish Ecology.

**Box 1.21 Berwickshire and North Northumberland Coast SAC**

*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Grey seal <i>H. grypus</i></li> </ul>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features;</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species; and</li> <li>● No significant disturbance of the species.</li> </ul>
Current status of qualifying feature	<p>The grey seal population is considered to be in favourable and maintained condition.</p> <p>Grey seals associated with the Berwickshire and North Northumberland Coast SAC are known to occur throughout the Forth Tay area but most frequently occur in the nearshore waters around Fast Castle and further offshore to the southeast of Neart na Gaoithe.</p> <p>There is very good evidence of a strong linkage between the grey seals associated with the SAC and those recorded offshore.</p> <p>The grey seal population (based on the number of pups) at the Berwickshire and North Northumberland Coast SAC has increased from 268 in 1999 to 1,715 in 2009.</p> <p>A total of 100 grey seals were recorded from site-specific surveys, of which eight were in the proposed offshore site.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
Noise from piling installation for wind turbine jacket foundations	Noise modelling undertaken indicates that there is a potential for displacement of grey seals from piling operations 50 km from the proposed development and that between 289 and 5,483 individuals may be displaced or show some behavioural effect when piling operations are being undertaken, depending on the model outputs selected. This may cause grey seals to leave the area for the duration of piling activities, predicted to be between nine and eighteen months. Grey seals occur primarily to the northwest and north and southeast of the proposed Neart na Gaoithe development and any displaced individuals will be able to relocate elsewhere. The effects of this displacement are uncertain but based on results from studies undertaken at Scroby Sands it is predicted that following cessation of piling, grey seals will return to the area. The displacement may cause an increase in intraspecific competition. The effects of displacement may be minor to moderate in their significance on the SAC as any displaced grey seals are predicted to return to the area following cessation of piling activities.
Noise from drilling installation wind turbine jacket foundations	Drilling noise will occur during the construction period when the majority of the turbines will be installed using a 'drill-drive-drill' technique. The level of noise arising from drilling may have a localised disturbance effect on grey seals but other species of pinniped have been reported near to drilling activities indicating that total avoidance from the area is unlikely. The relatively low numbers of grey seals recorded in the offshore site indicate that any localised impacts from sound arising from drilling may, if it occurs, cause the displacement of low numbers of grey seal. Any displaced seals will be able to relocate away from the drilling activities and it is predicted that there will be no adverse effects from drilling activities.
Noise from vessels during construction/installation and operation/maintenance	The level of noise arising from vessel activities that may have a behavioural or displacement effect will be relatively localised and not impact on grey seals occurring in the inshore waters of the Forth Tay area. Seals may avoid vessels working on site but relatively few grey seals were recorded at Neart na Gaoithe and tagging studies confirm that they use the area infrequently. Furthermore, there are anecdotal observations of seals frequently occurring in harbours where there are active vessel, for example, Aberdeen and Peterhead, and therefore seals appear not to avoid areas where there is vessel noise. Consequently, there will not be an adverse effect arising from vessel noise.
Presence of vessels during construction/installation and operation/maintenance	<b>Collision risk</b> Neart na Gaoithe is outside the area regularly used by grey seals with most occurring to the north of the proposed development. Vessel movements associated with the proposed development will remain within existing shipping lanes until in proximity of the offshore site. Collisions with seals by vessels are not unknown but seals are recognised to be agile swimmers and predicted to avoid the relatively slow moving vessels likely to be used during the construction and operation of the wind farm. Therefore, there will be little or no risk of collision with grey seals. It is concluded that there will not be an adverse effect arising from vessel collisions.

Effect arising from project	Predicted impact and assessment of LSE
<p><b>Presence of vessels during construction/installation and operation/maintenance (continued)</b></p>	<p><b>Interaction with thrusters</b></p> <p>There have been reports of grey seals being impacted by thrusters used by vessels to maintain position during working operations. The majority of incidents reported relating to grey seals are from North Norfolk, although there are other reports from elsewhere. Most records relating to grey seals have occurred during the winter months and are of juveniles. Details of how or why seals become impacted by thrusters are currently unknown. Vessels used during the construction, operation and decommissioning of the proposed development will use thrusters and therefore potentially impact on grey seals. However, the number of seals recorded in the offshore site have been relatively low and based on the number of reported incidents the risk is low. Mitigation measures in place at the time, such as the use of observers and or cameras during operations and the use, when practical, of grills over the thrusters will help reduce the risk of an impact occurring. The potential scale of any impact is predicted to be low and the number of seals in the area is also relatively low. Therefore, it is predicted that there will not be an adverse effect on the Berwickshire and North Northumberland Coast SAC grey seal population.</p>
<p><b>In-combination effects</b></p>	
<p><b>Effects arising in combination with other plans or projects</b></p>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on grey seals. In particular, other proposed offshore wind farms in the Forth and Tay area.</p> <p>Noise modelling predicts that a total of 344 grey seal may be displaced cumulatively in the Forth and Tay area should piling activities be undertaken simultaneously. The effect on the displaced grey seal will be similar to those arising from Neart na Gaoithe on its own but the spatial extent of area impacted will be greater, as will the duration of the impacts. The cumulative impacts from displacement are predicted to be of minor significance, as displaced grey seals are predicted to return to the area once construction activities have ceased and the population is in favourable condition.</p> <p>There is potential for up to 993 grey seals to receive levels of sound that could cause Temporary Threshold Shift (TTS) and 83 that could receive levels that cause Permanent Threshold Shift (PTS). Although hearing is not thought to be significant for foraging in grey seals, there may be behavioural effects caused by PTS that could cause increased mortality. A TTS will not necessarily cause a grey seal to reduce foraging and the duration of TTS is predicted to last for short period of time and less than 24 hours. Therefore the impact of TTS will be temporary and would not cause an adverse effect on harbour seals. However, the number of individuals predicted to receive levels of sound that cause PTS is potentially significant.</p>

**Box 1.22 Firth of Tay and Eden Estuary SAC**
*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Harbour seal <i>P. vitulina</i></li> </ul>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species; and</li> <li>● No significant disturbance of the species.</li> </ul>
Current status of qualifying feature	<p>The current population of harbour seals is 124 individuals and at the time of designation was 600 individuals. Harbour seals are considered to be in unfavourable and declining condition. Harbour seals associated with the Firth of Tay and Eden Estuary SAC are known to occur throughout the Forth Tay area but most frequently occur in the nearshore waters of the Tay and Eden estuaries and offshore waters to the north of Neart na Gaoithe.</p> <p>There is very good evidence of a strong linkage between the harbour seals associated with the SAC and those recorded offshore.</p> <p>The harbour seal population in the Firth of Tay and Eden Estuary has undergone significant population decline in the last 10 years, decreasing from 600 individuals to 124 in 2010. The cause of the decline is unknown but if it continues at the current rate, the SAC population is predicted to be near extinction within the next 10 years.</p> <p>Within the Neart na Gaoithe offshore site two harbour seals were recorded and a further 21 harbour seals were recorded in the buffer zone.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
Noise from piling installation for wind turbine jacket foundations	<p>Noise modelling undertaken indicates that there is a potential for displacement of harbour seals from piling operations 50 km from the proposed development and that up to 314 individuals may be displaced or show some behavioural effect when piling operations are being undertaken. This may cause harbour seals to leave the area for the duration of piling activities predicted to be between 9 and 18 months. Harbour seals occur primarily to the northwest and north of the proposed Neart na Gaoithe development and any displaced individuals will be able to relocate elsewhere but this may not be within the Firth of Forth and Tay Estuary SAC. The effects of this displacement are uncertain but based on results from studies undertaken in Denmark and UK it is predicted that following cessation of piling harbour seals will return to the area. The displacement may cause an increase in intraspecific competition. The effects of displacement may be moderate in their significance.</p> <p>It is recognised that the current condition of the harbour seal population is considered unfavourable and declining and that unless there is a change in status is likely to become extinct in approximately the next 10 years. The cause of the decline is unknown and the temporary displacement may hasten the decline.</p>
Noise from drilling installation wind turbine jacket foundations	<p>Drilling noise will occur during the construction period when the majority of the turbines will be installed using a 'drill-drive-drill' technique. The level of noise arising from drilling may have a localised disturbance effect on harbour seals but other species of pinniped have been reported near to drilling activities indicating that total avoidance from the area is unlikely. The few records of harbour seals recorded indicate that the species is scarce in the proposed Neart na Gaoithe offshore site and the localised impacts from sound arising from drilling indicate that there will be no adverse effects from drilling activities.</p>
Noise from vessels during construction/installation and operation/maintenance	<p>The level of noise arising from vessel activities that may have a behavioural or displacement effect will be relatively localised and not impact on harbour seals occurring in the inshore waters of the Forth Tay area. Seals may avoid vessels working on site but very few harbour seals were recorded at Neart na Gaoithe and tagging studies confirm that they use the area infrequently. Furthermore, there are anecdotal observations of seals frequently occurring in harbours where there are active vessels, e.g., Aberdeen and Peterhead, and therefore seals appear not to avoid areas where there is vessel noise. Consequently, there will not be an adverse effect arising from vessel noise.</p>
Presence of vessels during construction/installation and operation/maintenance	<p><b>Collision risk</b></p> <p>Neart na Gaoithe is outside the area regularly used by harbour seals and vessel movements associated with the proposed development will remain within existing shipping lanes until in proximity of the offshore site. Collision of seals by vessels is not unknown but seals are recognised to be agile swimmers and predicted to avoid the relatively slow moving vessels likely to be used during the construction and operation of the wind farm. Therefore there will be little or no risk of collision with harbour seals. It is concluded that there will not be an adverse effect arising from vessel collisions.</p>

Effect arising from project	Predicted impact and assessment of LSE
<b>Presence of vessels during construction/installation and operation/maintenance (continued)</b>	<p><b>Interaction with thrusters</b></p> <p>There have been reports of harbour seals being impacted by thrusters used by vessels to maintain position during working operations. A significant proportion of recorded incidents have occurred in the Forth and Tay area, although there are other reports from elsewhere. Most records relating to harbour seals have occurred during the summer months and are of adult females. Details of how or why seals become impacted by thrusters are currently unknown. Vessels used during the construction, operation and decommissioning of proposed development will use thrusters and therefore potentially impact on harbour seals. However, the number of harbour seals recorded in the offshore site have been very low and based on the number of reported incidents, the risk is low (however, this will be an underestimate). Mitigation measures in place at the time such as the use of observers and or cameras during operations and the use, when practical, of grills over the thrusters will help reduce the risk of an impact occurring. The potential scale of any impact is predicted to be low and the number of harbour seals in the area is also low. Therefore, it is predicted that there will not be an adverse effect on the Firth of Tay and Eden estuary SAC population. However, it is noted that the population of harbour seals is in a significant decline and any additional impact may accelerate the decline.</p>
<b>In-combination effects</b>	
<b>Effects arising in combination with other plans or projects</b>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on harbour seals. In particular other proposed offshore wind farms in the Forth and Tay area.</p> <p>Noise modelling predicts that a total of 305 harbour seal may be displaced cumulatively in the Forth and Tay area should piling activities be undertaken simultaneously. The effect on the displaced harbour seal will be similar to those arising from Neart na Gaoithe on its own but the spatial extent of area impacted will be greater, as will the duration of the impacts. The cumulative impacts from displacement are predicted to be of moderate significance.</p> <p>There is potential for up to 96 harbour seal to receive levels of sound that could cause TTS and nine PTS. Although hearing is not thought to be significant for foraging in harbour seals, there may be behavioural effects caused by PTS that could cause increased mortality. A TTS will not necessarily cause a harbour seal to reduce foraging and the duration of TTS is predicted to last for short period of time and less than 24 hours. Therefore, the impact of TTS will be temporary and would not cause an adverse effect on harbour seals. The number of harbour seals at risk of cumulative PTS may be significant if PTS causes an increase in mortality to a population that is not in favourable condition.</p>

**Box 1.23 Isle of May SAC**

*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Grey seal <i>H. grypus</i></li> </ul>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species; and</li> <li>● No significant disturbance of the species.</li> </ul>
Current status of qualifying feature	<p>The current population for grey seals at the Isle of May SAC is 2,065 individuals and the population is considered to be in favourable and maintained condition. Grey seals associated with the Isle of May SAC are known to occur throughout the Forth Tay area but most frequently occur in the nearshore waters around the Isle of May and further offshore to the southeast, north and northwest of Neart na Gaoithe.</p> <p>There is very good evidence of a strong linkage between the grey seals associated with the SAC and those recorded offshore.</p> <p>The grey seal population (based on the number of pups) at the Isle of May SAC has remained relatively stable over the last 10 years with counts of between 1,700 and 2,000 individuals. A total of 100 grey seals were recorded from site-specific surveys, of which eight were in the proposed offshore site.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
Noise from piling installation for wind turbine jacket foundations	Noise modelling undertaken indicates that there is a potential for displacement of grey seals from piling operations 50 km from the proposed development and that up between 289 and 5,483 individuals may be displaced or show some behavioural effect when piling operations are being undertaken depending on the model outputs selected. This may cause grey seals to leave the area for the duration of piling activities predicted to be between 9 and 18 months. Grey seals occur primarily to the northwest and north and southeast of the proposed Neart na Gaoithe development and any displaced individuals will be able to relocate elsewhere but may be not within the Isle of May SAC. The effects of this displacement are uncertain but based on results from studies undertaken at Scroby Sands it is predicted that following cessation of piling grey seals will return to the area. The displacement may cause an increase in intraspecific competition. The effects of displacement may be minor to moderate in their significance on the SAC as any displaced grey seals are predicted to return to the area following cessation of piling activities.
Noise from drilling installation wind turbine jacket foundations	Drilling noise will occur during the construction period when the majority of the turbines will be installed using a 'drill-drive-drill' technique. The level of noise arising from drilling may have a localised disturbance effect on grey seals but other species of pinniped have been reported near to drilling activities indicating that total avoidance from the area is unlikely. The relatively low numbers of grey seals recorded in the offshore site indicate that any localised impacts from sound arising from drilling may, if it occurs, cause the displacement of low numbers of grey seal. Any displaced seals will be able to relocate away from the drilling activities and it is predicted that there will be no adverse effects from drilling activities.
Noise from vessels during construction/installation and operation/maintenance	The level of noise arising from vessel activities that may have a behavioural or displacement effect will be relatively localised and not impact on grey seals occurring in the inshore waters of the Forth Tay area. Seals may avoid vessels working on site but relatively few grey seals were recorded at Neart na Gaoithe and tagging studies confirm that they use the area infrequently. Furthermore, there are anecdotal observations of seals frequently occurring in harbours where there are active vessels such as Aberdeen and Peterhead and therefore seals appear not to avoid areas where there is vessel noise. Consequently, there will not be an adverse effect arising from vessel noise.
Presence of vessels during construction/installation and operation/maintenance	<b>Collision risk</b> Neart na Gaoithe is outside the area regularly used by grey seals with most occurring to the north of the proposed development. Vessel movements associated with the proposed development will remain within existing shipping lanes until in proximity of the offshore site. Collision with seals by vessels is not unknown but seals are recognised to be agile swimmers and predicted to avoid the relatively slow moving vessels likely to be used during the construction and operation of the wind farm. Therefore, there will be little or no risk of collision with grey seals. It is concluded that there will not be an adverse effect arising from vessel collisions.

Effect arising from project	Predicted impact and assessment of LSE
<p><b>Presence of vessels during construction/installation and operation/maintenance (continued)</b></p>	<p><b>Interaction with thrusters</b></p> <p>There have been reports of grey seals being impacted by thrusters used by vessels to maintain position during working operations. The majority of incidents reported relating to grey seals are from North Norfolk, although there are other reports from elsewhere. Most records relating to grey seals have occurred during the winter months and are of juveniles. Details of how or why seals become impacted by thrusters are currently unknown. Vessels used during the construction, operation and decommissioning of proposed development will use thrusters and therefore potentially impact on grey seals. However, the number of seals recorded in the offshore site have been relatively low and based on the number of reported incidents the risk is low. Mitigation measures in place at the time such as the use of observers and or cameras during operations and the use, when practical, of grills over the thrusters will help reduce the risk of an impact occurring. The potential scale of any impact is predicted to be low and the number of seals in the area is also relatively low. Therefore, it is predicted that there will not be an adverse effect on the Isle of May grey seal population.</p>
<p><b>In-combination effects</b></p>	
<p><b>Effects arising in combination with other plans or projects</b></p>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on grey seals. In particular other proposed offshore wind farms in the Forth and Tay area.</p> <p>Noise modelling predicts that a total of 344 grey seal may be displaced cumulatively in the Forth and Tay area should piling activities be undertaken simultaneously. The effect on the displaced grey seal will be similar to those arising from Neart na Gaoithe on its own but the spatial extent of area impacted will be greater, as will the duration of the impacts. The cumulative impacts from displacement are predicted to be of minor significance, as displaced grey seals will return to the area once construction activities have ceased and the population is in favourable condition.</p> <p>There is potential for up to 993 grey seals to receive levels of sound that could cause TTS and 83 that could receive levels that cause PTS. Although hearing is not thought to be significant for foraging in grey seals, there may be behavioural effects caused by PTS that could cause increased mortality. ATTS will not necessarily cause a grey seal to reduce foraging and the duration of TTS is predicted to last for short period of time and less than 24 hours. Therefore the impact of TTS will be temporary and would not cause an adverse effect on harbour seals. However, the number of individuals predicted to receive levels of sound that cause PTS is potentially significant.</p> <p>In addition to the proposed developments in the Firth of Tay area there are potential cumulative impacts with planned projects in the Moray Firth. Grey seals associated with the SAC are likely to occur in the Moray Firth where there is potential for behavioural avoidance to occur. Should this occur then the grey seals will relocate. The impacts may cause a negative effect on the grey seals during piling operations.</p>

**Box 1.24 Moray Firth SAC**

*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Bottlenose dolphin <i>T. truncatus</i></li> </ul>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species; and</li> <li>● No significant disturbance of the species.</li> </ul>
Current status of qualifying feature	<p>Bottlenose dolphins are in considered to be in unfavourable and recovering population.</p> <p>Bottlenose dolphins associated with Moray Firth SAC are known to forage widely with good evidence of a strong linkage between the individuals known to occur within the SAC and sites elsewhere along the nearshore waters of the east coast of Scotland, including the Forth and Tay area. No bottlenose dolphins have been recorded from 2 years of boat-based surveys or from nearly 1 year of aerial surveys within the proposed Neart na Gaoithe development or buffer area. Consequently, the distribution of bottlenose dolphins along the east coast of Scotland is primarily coastal and is one population estimated to be totalling 193 (range 162-245) individuals or 195 (range 162-253) individuals from different studies (see Chapter 13: Marine Mammals for more information). At the time of designation the population was 130 individuals.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
Noise from piling installation for wind turbine jacket foundations	Noise modelling undertaken indicates that there is a potential for displacement of bottlenose dolphins from piling operations between 35 km and 39 km from the proposed development and that up to 124 bottlenose dolphin may either be displaced or show some behavioural response when piling operations are being undertaken. This may cause bottlenose dolphins to leave the area for the duration of piling activities predicted to be between 9 and 18 months. Bottlenose dolphins range widely between the Moray Firth and the Forth and Tay area and any displaced individuals will relocate elsewhere. The effects of this displacement are uncertain but as bottlenose dolphins already occur in these areas they are not considered unsuitable areas for the displaced bottlenose dolphins to temporarily move to. There may be an increase in intraspecific competition so the effects of displacement may not be negligible but are predicted to be minor and unlikely to cause an adverse effect. It is recognised that the current condition of the population is considered unfavourable and recovering.
Noise from drilling installation wind turbine jacket foundations	Drilling noise will occur during the construction period when the majority of the turbines will be installed using a 'drill-drive-drill' technique. Drilling noise is of low frequency and has been reported as being below the threshold at which bottlenose dolphins will be able to detect unless in close proximity to the drilling activities. No bottlenose dolphins have been recorded within the development or the buffer area and are therefore rare in the Neart na Gaoithe offshore site. Consequently, it is predicted that there will not be an adverse effect on the bottlenose dolphins from drilling operations.
Noise from vessels during construction/installation and operation/maintenance	The level of noise arising from vessel activities will be relatively localised and not impact on bottlenose dolphins occurring in the inshore waters of the Forth Tay area. Consequently, there will not be an adverse effect arising from vessel noise.
Presence of vessels during construction/installation and operation/maintenance	Neart na Gaoithe is outwith the area used by bottlenose dolphins and vessel movements associated with the proposed development will remain within existing shipping lanes until in proximity of the offshore site. Therefore there will be little or no risk of collision with bottlenose dolphins. It is concluded that there will not be an adverse effect arising from vessel collisions.

Effect arising from project	Predicted impact and assessment of LSE
<b>In-combination effects</b>	
<b>Effects arising in combination with other plans or projects</b>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on bottlenose dolphins. In particular other proposed offshore wind farms in the Forth and Tay area and also in the Moray Firth and Aberdeen Bay.</p> <p>Noise modelling predicts that a total of 124 bottlenose dolphins may be displaced cumulatively in the Forth and Tay area should piling activities be undertaken simultaneously. The effect on the displaced bottlenose dolphins will be similar to those arising from Neart na Gaoithe on its own but the spatial extent of area avoided will be greater, as will the duration of the impacts. The cumulative impacts from displacement are predicted to be of moderate significance.</p> <p>There is potential for up to six bottlenose dolphins to receive levels of sound that could cause TTS. A TTS may cause the individual to reduce foraging and communication but the duration of TTS is known to last for short period of time and less than 24 hours. Therefore the impact of TTS will be temporary and not cause an adverse effect on bottlenose dolphin.</p> <p>There is potential for cumulative impacts arising from the construction of Beatrice and Moray Firth Offshore Wind Farms are unknown as no information is currently available to make an assessment. Noise modelling undertaken for the Moray Firth indicates a potential displacement of up to 43 km. Although there is no overlap in the levels of noise predicted to cause behavioural responses between the Moray Firth and Firth of Tay developments, there is a potential for a cumulative displacement or behavioural effect. This cumulative effect could cause increased intra-specific competition in less favourable areas as bottlenose dolphins avoid the areas during construction. However, presuming that the area of effect from piling activities is of a similar magnitude as those modelled for the Forth Tay developers then the impact on the same population of bottlenose dolphins may during the period of construction be proportionally larger and be potentially adverse.</p> <p>However, based on the current schedules for the projects it is predicted that not all developments will be constructing simultaneously and consequently the scale of predicted impact will be lower.</p>

**Box 1.25 River South Esk SAC**
*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Atlantic salmon <i>S. salar</i>; and</li> <li>● Freshwater pearl mussel <i>M. margarifera</i> (FWPM).</li> </ul> <p><b>Note:</b> FWPM remain in the River South Esk and are not present in the Firth of Forth, however salmon are integral to the life cycle of FWPM. Therefore any potential impacts on FWPM relate to those directly on salmon that could then indirectly affect FWPM.</p>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species, including range of genetic types for salmon, as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species;</li> <li>● No significant disturbance of the species;</li> <li>● Distribution and viability of freshwater pearl mussel host species; and</li> <li>● Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.</li> </ul>
Current status of qualifying feature	<p>The salmon population is currently considered to be unfavourable recovering. The FWPM population is currently considered to be unfavourable declining.</p> <p>No individuals of the species were noted in site-specific surveys for the Neart na Gaoithe project. The available information indicates that post smolt salmon migrate rapidly and actively towards open sea from their river sources and do not follow nearby shores except in areas subject to strong coastal currents. Once at sea, migration is northward along the continental shelf, using dominant ocean currents. Spent or spawned salmon, known as kelts, migrate to sea rapidly in shallow waters. Adults return to Scottish waters from areas to the north and west of the British Isles.</p> <p>Information available shows that some diadromous species have been observed on previous surveys may be assumed to be present around the export cables route area rather than the offshore development. However, overall migratory route and distribution data in the Firth of Forth (and elsewhere) are currently limited and species such as salmon are known to be present, although their presence is in small numbers and transient. The currently available information on the migratory routes of salmon is scarce, as a result of this uncertainty the precautionary approach has been taken to assume salmon and sea trout are present offshore.</p>

*Likely Significant Effect*

Effect arising from project	Predicted impact and assessment of LSE
Increase in SSC from installation of turbines, subsea cables and associated structures during construction/installation	<p>Physical processes modelling indicates that the installation of turbines and associated structures may result in the discharge of dredged material, which is predicted to lead to elevated SSC with peaks of up to 300 mg/l (depth averaged) very close to the release location. However, the resulting plumes will not be advected beyond the immediate vicinity of the dredging site with concentrations predicted to be less than 10 mg/l within 1 km of the gravity base, which are negligible in severity when compared against natural background levels ranging from 3 to 8 mg/l. The suspended sediment plume (&gt;1 mg/l) is predicted to extend up to 4 km from the release location and will settle out of the water column within one day if released near the surface. In addition, the duration over which the activity will take place will be short and limited to the proximity of the release location.</p> <p>Adult fish would normally be able to detect significantly elevated levels of suspended sediment and avoid the affected area, although juvenile fish may be more susceptible than adult fish to plumes. It is likely that fish and shellfish species found in the area will be adapted to temporary increases in SSC via winter storm events. The SCC generated during such a storm will be of greater magnitude than will be produced by the construction works.</p> <p>Salmon are reported to be vulnerable to structures (e.g., areas of increased suspended sediment) which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on these species will depend on their ability to move and avoid barrier structures, thus for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p> <p>The overall significance of the impact of increased SSC and turbidity on fish and shellfish is considered to be of minor significance.</p>
Noise from piling of wind turbine jacket foundations during construction/installation	<p>Noise modelling indicates that salmon may strongly avoid an area out to a maximum of 2.6 km, (3.5 m diameter pile); or for a 2.5 m diameter pile 1.5 km. The radius of significant avoidance behaviour is likely to extend up to 14 km (3.5 m diameter pile) and 9.2 km (2.5 m diameter pile).</p> <p>Salmon is reported to hear very poorly and is considered a hearing 'generalist' (or 'nonspecialist'). The behavioural avoidance as a consequence of increased underwater noise is not fully documented for the species, with the available literature indicating a mild reaction by the salmon at distances of 60 to 80 m. Research trials on the effects of pile driving carried out with caged farmed <i>S. trutta</i> revealed no evidence that the fish reacted to impact piling at a distance of about 400 m nor to vibration piling at close ranges (&lt;50 m).</p> <p>The overall impact on salmon is predicted to be of minor significance.</p>

Effect arising from project	Predicted impact and assessment of LSE
<b>Presence of offshore structures during construction, operation and maintenance</b>	<p>Salmon are reported to be vulnerable to structures which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on to these species will depend on their ability to move and avoid barrier structures, thus for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p>
<b>Gearbox and generator of wind turbines generating noise during operation and maintenance</b>	<p>The noise from the operation of wind turbines is generated by the gearbox and generator and transferred into the water and sediment through the tower and foundations. Wind farms source levels are influenced by size and shape of the foundation, age and model of the turbines and the number of turbines. In addition, transmission loss is site-specific, hence any estimate of the amount of noise likely to be generated during the operational phase of a wind farm are highly site-specific with the highest noise levels likely to be recorded in close proximity (1 m) from the foundation during moderate wind speeds. Fish species sensitive to particle motion (of which salmon is one) will only be able to sense the measured particle acceleration at distance of about 10 m from the foundation. Further away many species are limited by either their hearing threshold or the ambient sound masking the wind farm noise.</p>
<b>Subsea cables (inter-array and export cables) generating electromagnetic fields</b>	<p>The main concern with electromagnetic fields (EMF) is that it will interfere with the navigation of sensitive migratory species by affecting the speed and/or the course of their migration, causing subsequent potential problems if they do not reach essential feeding, spawning and nursery grounds. Specifically, interaction may occur if the fish migration route coincides with the cables particularly in shallow waters (&lt;20 m) where there is greater probability of encounter with the high voltage cables coming to shore. If sufficient numbers of individuals are affected this could have consequences at the population and community scale. The overall effect of EMF is assessed to be of minor significance based on the relatively small footprint of the cables within the Neart na Gaoithe offshore works area and export cable. The current view within the scientific community is that there is no evidence that this capability will translate into any significant effect.</p>
<b>In-combination effects</b>	
<b>Effects arising in combination with other plans or projects</b>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on salmon and therefore potentially FWPM. The Plan level HRA further recommends that consideration of cumulative or in-combination impacts should cover impacts from the other wind farm developments in the Forth and Tay region. Noise modelling results for simultaneous piling at all three offshore wind farm developments indicates that salmon also show a degree of overlap with regard to the significant avoidance behaviour. The significance of the impact of behavioural avoidance on migratory species, e.g., salmon, depends on how easily these species can avoid the area. The cumulative effect of the pile driving noise will result in a larger radius, which may be energetically costly for the species to avoid. Given the vulnerability of the species outlined above, the overall impact is assessed to be of minor to moderate significance.</p>

**Box 1.26 River Tay SAC**

*Site Information*

Topic	Information
<b>Qualifying feature with connectivity to Neart na Gaoithe</b>	<ul style="list-style-type: none"> <li>● Atlantic salmon <i>S. salar</i>;</li> <li>● Freshwater pearl mussel <i>M. margaritifera</i>;</li> <li>● Sea lamprey <i>P. marinus</i>; and</li> <li>● River lamprey <i>L. fluviatilis</i>.</li> </ul> <p><b>Note:</b> FWPM remain in the River South Esk and are not present in the Firth of Forth, however salmon are integral to the life cycle of FWPM. Therefore, any potential impacts on FWPM relate to those directly on salmon that could then indirectly affect FWPM.</p>
<b>Conservation objectives of qualifying feature</b>	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species, including range of genetic types for salmon, as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species; and</li> <li>● No significant disturbance of the species.</li> </ul>
<b>Current status of qualifying feature</b>	<p>All qualifying features, including those outlined as with potential connectivity with Neart na Gaoithe, are considered to be at a favourable maintained condition.</p> <p>No individuals of the species outlined were noted in site-specific surveys for the Neart na Gaoithe project. The available information for Atlantic salmon indicate that post smolt salmon migrate rapidly and actively towards open sea from their river sources and do not follow nearby shores except in areas subject to strong coastal currents. Once at sea, migration is northward along the continental shelf, using dominant ocean currents. Spent or spawned salmon, known as kelts, migrate to sea rapidly in shallow waters. Adults return to Scottish waters from areas to the north and west of the British Isles.</p> <p>Information available shows that some diadromous species have been observed on previous surveys may be assumed to be present around the export cables route area rather than the offshore development. However, overall migratory route and distribution data in the Firth of Forth (and elsewhere) are currently limited and species are known to be present, although their presence is in small numbers and transient.</p> <p>The currently available information on the migratory routes of species outlined is scarce. As a result of this uncertainty, the precautionary approach has been taken to assume salmon and sea lamprey are present offshore. River lamprey has a propensity to remain within river and estuarine/nearshore waters. It is considered unlikely that river lamprey will be significantly influenced by barrier or noise/vibration effects. It is proposed to assess river lamprey in terms of potential operational effects of EMF emissions only.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
<b>Increase in SSC from installation of turbines, subsea cables and associated structures during construction/installation</b>	<p>Physical processes modelling indicates that the installation of turbines and associated structures may result in the discharge of dredged material, which is predicted to lead to elevated SSC with peaks of up to 300 mg/l (depth averaged) very close to the release location. However, the resulting plumes will not be advected beyond the immediate vicinity of the dredging site with concentrations predicted to be less than 10 mg/l within 1 km of the gravity base, which are negligible in severity when compared against natural background levels ranging from 3 to 8 mg/l. The suspended sediment plume (&gt;1 mg/l) is predicted to extend up to 4 km from the release location and will settle out of the water column within one day if released near the surface. In addition, the duration over which the activity will take place will be short and limited to the proximity of the release location.</p> <p>Adult fish would normally be able to detect significantly elevated levels of suspended sediment and avoid the affected area, although juvenile fish may be more susceptible than adult fish to plumes. It is likely that fish and shellfish species found in the area will be adapted to temporary increases in SSC via winter storm events. The SCC generated during such a storm will be of greater magnitude than will be produced by the construction works.</p> <p>Salmon are reported to be vulnerable to structures (e.g., areas of increases suspended sediment) which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on to these species will depend on their ability to move and avoid barrier structures, thus for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p> <p>The overall significance of the impact of increased SSC and turbidity on fish and shellfish is considered to be of minor significance.</p>

Effect arising from project	Predicted impact and assessment of LSE
<p><b>Noise from piling of wind turbine jacket foundations during construction/installation</b></p>	<p>Noise modelling indicates that salmon may strongly avoid an area out to a maximum of 2.6 km, (3.5 m diameter pile); or for a 2.5 m diameter pile 1.5 km. The radius of significant avoidance behaviour is likely to extend up to 14 km (3.5 m diameter pile) and 9.2 km (2.5 m diameter pile).</p> <p>Salmon is reported to hear very poorly and is considered a hearing 'generalist' (or 'non-specialist'). The behavioural avoidance as a consequence of increased underwater noise is not fully documented for the species, with the available literature indicating a mild reaction by the salmon at distances of 60 to 80 m. Research trials on the effects of pile driving carried out with caged farmed <i>S. trutta</i> revealed no evidence that the fish reacted to impact piling at a distance of about 400 m nor to vibration piling at close ranges (&lt;50 m).</p> <p>The overall impact on salmon is predicted to be of minor significance.</p>
<p><b>Presence of offshore structures during construction, operation and maintenance</b></p>	<p>Salmon are reported to be vulnerable to structures which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on to these species will depend on their ability to move and avoid barrier structures, therefore, for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p>
<p><b>Gearbox and generator of wind turbines generating noise during operation and maintenance</b></p>	<p>The noise from the operation of wind turbines is generated by the gearbox and generator and transferred into the water and sediment through the tower and foundations. Wind farms source levels are influenced by size and shape of the foundation, age and model of the turbines and the number of turbines. In addition, transmission loss is site-specific, hence any estimate of the amount of noise likely to be generated during the operational phase of a wind farm are highly site-specific with the highest noise levels likely to be recorded in close proximity (1 m) from the foundation during moderate wind speeds.</p> <p>Fish species sensitive to particle motion (of which salmon is one) will only be able to sense the measured particle acceleration at distance of about 10 m from the foundation. Further away many species are limited by either their hearing threshold or the ambient sound masking the wind farm noise.</p>
<p><b>Subsea cables (inter-array and export cables) generating electromagnetic fields</b></p>	<p>The main concern with EMF is that it will interfere with the navigation of sensitive migratory species by affecting the speed and/or the course of their migration, causing subsequent potential problems if they do not reach essential feeding, spawning and nursery grounds. Specifically, interaction may occur if the fish migration route coincides with the cables particularly in shallow waters (&lt;20 m) where there is greater probability of encountering with the high voltage cables coming to shore. If sufficient numbers of individuals are affected this could have consequences at the population and community scale.</p> <p>The detection of magnetic and electric fields in species such as sea lamprey <i>Petromyzon marinus</i> and European eel <i>Anguilla anguilla</i> has been closely related to navigation during long distances migrations and the locating of spawning grounds.</p> <p>The overall effect of EMF is assessed to be of minor significance based on the relatively small footprint of the cables within the Neart na Gaoithe offshore works area and export cable. The current view within the scientific community is that there is no evidence that this capability will translate into any significant effect.</p>
<p><b>In-combination effects</b></p>	
<p><b>Effects arising in combination with other plans or projects</b></p>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on salmon and therefore potentially FWPM. The Plan level HRA further recommends that consideration of cumulative or in-combination impacts should cover impacts from the other wind farm developments in the Forth and Tay region.</p> <p>Noise modelling results for simultaneous piling at all three offshore wind farm developments indicates that salmon also show a degree of overlap with regard to the significant avoidance behaviour. The significance of the impact of behavioural avoidance on migratory species, e.g., salmon, depends on how easily these species can avoid the area.</p> <p>The cumulative effect of the pile driving noise will result in a larger radius, which may be energetically costly for the species to avoid. Given the vulnerability of the species outlined above, the overall impact is assessed to be of minor to moderate significance.</p>

**Box 1.27 River Teith SAC**

*Site Information*

Topic	Information
Qualifying feature with connectivity to Neart na Gaoithe	<ul style="list-style-type: none"> <li>● Atlantic salmon <i>S.salar</i>;</li> <li>● Sea lamprey <i>P. marinus</i>; and</li> <li>● River lamprey <i>L. fluviatilis</i>.</li> </ul>
Conservation objectives of qualifying feature	<p>To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status for each of the qualifying features.</p> <p>To ensure for the qualifying species that the following are established then maintained in the long term:</p> <ul style="list-style-type: none"> <li>● Population of the species, including range of genetic types for salmon, as a viable component of the site;</li> <li>● Distribution of the species within site;</li> <li>● Distribution and extent of habitats supporting the species;</li> <li>● Structure, function and supporting processes of habitats supporting the species;</li> <li>● No significant disturbance of the species;</li> <li>● Distribution and viability of freshwater pearl mussel host species; and</li> <li>● Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.</li> </ul>
Current status of qualifying feature	<p>The salmon population is currently considered to be unfavourable recovering. The FWPM population is currently considered to be unfavourable declining.</p> <p>No individuals of the species were noted in site-specific surveys for the Neart na Gaoithe project. The available information indicate that post smolt salmon migrate rapidly and actively towards open sea from their river sources and do not follow nearby shores except in areas subject to strong coastal currents. Once at sea, migration is northward along the continental shelf, using dominant ocean currents. Spent or spawned salmon, known as kelts, migrate to sea rapidly in shallow waters. Adults return to Scottish waters from areas to the north and west of the British Isles.</p> <p>Information available shows that some diadromous species have been observed on previous surveys and may be assumed to be present around the export cables route area rather than the offshore development. However, overall migratory route and distribution data in the Firth of Forth (and elsewhere) are currently limited and species such as salmon are known to be present, although their presence is in small numbers and transient.</p> <p>The currently available information on the migratory routes of salmon is scarce, as a result of this uncertainty the precautionary approach has been taken to assume salmon and sea trout are present offshore.</p>

*Potential Adverse Effects*

Effect arising from project	Predicted impact and assessment of LSE
Increase in SSC from installation of turbines, subsea cables and associated structures during construction/installation	<p>Physical processes modelling indicates that the installation of turbines and associated structures may result in the discharge of dredged material, which is predicted to lead to elevated SSC with peaks of up to 300 mg/l (depth averaged) very close to the release location. However, the resulting plumes will not be advected beyond the immediate vicinity of the dredging site with concentrations predicted to be less than 10 mg/l within 1 km of the gravity base, which are negligible in severity when compared against natural background levels ranging from 3 to 8 mg/l. The suspended sediment plume (&gt;1 mg/l) is predicted to extend up to 4 km from the release location and will settle out of the water column within one day if released near the surface. In addition, the duration over which the activity will take place will be short and limited to the proximity of the release location.</p> <p>Adult fish would normally be able to detect significantly elevated levels of suspended sediment and avoid the affected area, although juvenile fish may be more susceptible than adult fish to plumes. It is likely that fish and shellfish species found in the area will be adapted to temporary increases in SSC via winter storm events. The SCC generated during such a storm will be of greater magnitude than will be produced by the construction works.</p> <p>Salmon are reported to be vulnerable to structures (e.g., areas of increases suspended sediment) which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on to these species will depend on their ability to move and avoid barrier structures, thus for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p> <p>The overall significance of the impact of increased SSC and turbidity on fish and shellfish is considered to be of minor significance.</p>

Effect arising from project	Predicted impact and assessment of LSE
<p><b>Noise from piling of wind turbine jacket foundations during construction/installation</b></p>	<p>Noise modelling indicates that salmon may strongly avoid an area out to a maximum of 2.6 km, (3.5 m diameter pile); or for a 2.5 m diameter pile 1.5 km. The radius of significant avoidance behaviour is likely to extend up to 14 km (3.5 m diameter pile) and 9.2 km (2.5 m diameter pile).</p> <p>Salmon is reported to hear very poorly and is considered a hearing 'generalist' (or 'nonspecialist'). The behavioural avoidance as a consequence of increased underwater noise is not fully documented for the species, with the available literature indicating a mild reaction by the salmon at distances of 60 to 80 m. Research trials on the effects of pile driving carried out with caged farmed <i>S. trutta</i> revealed no evidence that the fish reacted to impact piling at a distance of about 400 m nor to vibration piling at close ranges (&lt;50 m).</p> <p>The overall impact on salmon is predicted to be of minor significance.</p>
<p><b>Presence of offshore structures during construction, operation and maintenance</b></p>	<p>Salmon are reported to be vulnerable to structures which could act as a barrier, preventing movement to their foraging or nursery grounds. The degree of impact of barrier effects on to these species will depend on their ability to move and avoid barrier structures, thus for example, structures placed in a highly confined estuary are likely to be more of an issue than in the open coast.</p>
<p><b>Gearbox and generator of wind turbines generating noise during operation and maintenance</b></p>	<p>The noise from the operation of wind turbines is generated by the gearbox and generator and transferred into the water and sediment through the tower and foundations. Wind farms source levels are influenced by size and shape of the foundation, age and model of the turbines and the number of turbines. In addition, transmission loss is site-specific, hence any estimate of the amount of noise likely to be generated during the operational phase of a wind farm are highly site-specific with the highest noise levels likely to be recorded in close proximity (1 m) from the foundation during moderate wind speeds.</p> <p>Fish species sensitive to particle motion (of which salmon is one) will only be able to sense the measured particle acceleration at distance of about 10 m from the foundation. Further away many species are limited by either their hearing threshold or the ambient sound masking the wind farm noise.</p>
<p><b>Subsea cables (inter-array and export cables) generating electromagnetic fields</b></p>	<p>The main concern with EMF is that it will interfere with the navigation of sensitive migratory species by affecting the speed and/or the course of their migration, causing subsequent potential problems if they do not reach essential feeding, spawning and nursery grounds. Specifically, interaction may occur if the fish migration route coincide with the cables particularly in shallow waters (&lt;20 m) where there is greater probability of encountering with the high voltage cables coming to shore. If sufficient numbers of individuals are affected this could have consequences at the population and community scale.</p> <p>The overall effect of EMF is assessed to be of minor significance based on the relatively small footprint of the cables within the Neart na Gaoithe offshore works area and export cable. The current view within the scientific community is that there is no evidence that this capability will translate into any significant effect. However, there is a lack of field experimental studies.</p>
<p><b>In-combination effects</b></p>	
<p><b>Effects arising in combination with other plans or projects</b></p>	<p>There are a number of other plans or programmes that could cause potential in-combination impacts on salmon and therefore potentially FWPM. The Plan level HRA further recommends that consideration of cumulative or in-combination impacts should cover impacts from the other wind farm developments in the Forth and Tay region.</p> <p>Noise modelling results for simultaneous piling at all three offshore wind farm developments indicates that salmon also show a degree of overlap with regard to the significant avoidance behaviour. The significance of the impact of behavioural avoidance on migratory species, such as salmon, depends on how easily these species can avoid the area.</p> <p>The cumulative effect of the pile driving noise will result in a larger radius, which may be energetically costly for the species to avoid. Given the vulnerability of the species outlined above, the overall impact is assessed to be of minor to moderate significance.</p>

## 11.9 References

- Birdlife International, 2012. *Important Bird Areas (IBAs)*. Available online from: <http://www.birdlife.org/action/science/sites/> [accessed 6 Jan 2012].
- BOWF, 2012. *Beatrice Offshore Wind Farm Environmental Statement*. Beatrice Offshore Wind Limited.
- Carruthers, M., Chaniotis, P.D., Clark, L., Crawford-Avis, O., Gillham, K., Linwood, M., Oates, J., Steel, L., and Wilson, E., 2011. *Contribution of existing protected areas to the MPA network and identification of remaining MPA search feature priorities*. Internal report produced by Scottish Natural Heritage, the Joint Nature Conservation Committee and Marine Scotland for the Scottish Marine Protected Areas Project.
- Defra (Department for Environment, Food and Rural Affairs), 2005. *Nature Conservation guidance on offshore wind farm development: A guidance note on the implications of the EC Wild Birds and Habitats Directives for Developers undertaking offshore wind farm developments*. Version R1.9. London, Defra.
- EN (English Nature), RSPB (Royal Society for the Protection of Birds), WWF (World Wildlife Fund) UK and the BWEA (British Wind Energy Association), 2001. *Wind farm development and nature conservation: A guidance document for nature conservation organisations and developers when consulting over wind farm proposals in England*. Available online from: <http://www.bwea.com/pdf/wfd.pdf> [accessed Apr 2011].
- EC (European Commission), 2010. *EU Guidance on Wind Energy Development in Accordance with EU Nature Legislation. Wind Energy Development and Natura 2000*. Guidance Document.
- EC (European Commission), 2002. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. Luxembourg: Office for Official Publications of the European Communities.
- IEEM (Institute of Ecology and Environmental Management), 2010. *Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal*. Council of the Institute of Ecology and Environmental Management.
- Jones, G., Cooper-Bohannon, R., Barlow, K., and Parsons, K., 2009. *Determining the potential ecological impact of wind turbines on bat populations in Britain*. Scoping and Method Development Report, Defra.
- JNCC (Joint Nature Conservation Committee), 2011. *Marine extensions to existing seabird breeding colony SPAs*. Available online from: <http://www.jncc.defra.gov.uk/page-4562> [accessed Dec 2011].
- Marine Scotland, 2011a. *Blue Seas – Green Energy: a Sectoral Marine Plan for Offshore Wind Energy in Scottish territorial Waters. Part B: Post Adoption Statement*. Edinburgh, Marine Scotland.
- Marine Scotland, 2011b. *Blue Seas – Green Energy: a Sectoral Marine Plan for Offshore Wind Energy in Scottish territorial Waters. Part A: The Plan*. Edinburgh, Marine Scotland.
- Marine Scotland, 2011c. *Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment Information Review*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marineenergy/wind> [accessed Jul 2011].
- Marine Scotland, 2011d. *Marine Protected Area Network*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork> [accessed Sep 2011].
- Marine Scotland, 2011e. *MPA search locations in Scottish waters – recommendations from the 3rd stakeholder workshop*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/engagement/workshop3/mpareport> [accessed 30 Nov 2011].
- Marine Scotland, 2012. *Marine Protected Areas: Stakeholder Engagement: Meeting 4: 14-15 March 2012*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/engagement> [accessed May 2012].
- Marine Scotland and the Scottish Government, 2011a. *A Strategy for Marine Nature Conservation in Scotland's Seas*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marine-environment/Conservationstrategy/marineconstrategy> [accessed Oct 2011].
- Marine Scotland, the Scottish Government, SNH and JNCC, 2011b. *Marine Protected Areas in Scotland's Seas: Guidelines on the selection of MPAs and development of the MPA network*. Available online from: <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/mpaguidelines> [accessed Sep 2011].
- McSorley, C.A., Dean, B.J., Webb, A., and Reid, J.B., 2003. *Seabird use of waters adjacent to colonies. Implications for seaward extensions to existing breeding seabird colony Special Protection Areas*. JNCC report no. 329.
- NE (Natural England), 2009. *Bats and onshore wind turbines. Interim Guidance. Natural England Technical Note TIN051*.
- NBN (National Biodiversity Network), 2011. *National Biodiversity Network*. Available online from: <http://www.nbn.org.uk/> [accessed Sep 2011].
- Rodrigues, L., Bach, L., Dubourg-Savage, M.J., Goodwin, J., and Harbusch, C., 2008. *Guidelines for consideration of bats in wind farm projects*. EUROBATS Publication Series No. 3 (English version). UNEP/EUROBATS Secretariat, Bonn, Germany.
- Scottish Executive, 1995. *Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ("The Habitats and Birds Directive")*. Revised Guidance Updating Scottish Office circular No 6.1995.
- Scottish Executive, 2006. *Assessing Development Plans in terms of the need for Appropriate Assessment. Interim Guidance*. Edinburgh, Scottish Executive.
- Scottish Government, 2011a. *Special Protection Areas*. Available online from: <http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA/SPAs> [accessed Sep 2011].
- Scottish Government, 2011b. *Biodiversity – Biodiversity Action Plan Species and Habitats: High Level Summary of Statistics Trend*. Available online from: <http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/TrendBAP> [accessed Sep 2011].
- SNH (Scottish Natural Heritage), 2009. *A Handbook on Environmental Impact Assessment. Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment Process in Scotland (3rd Ed.)*
- SNH (Scottish Natural Heritage), 2010. *Neart na Gaoithe – Proposed Offshore Windfarm: SNH and JNCC Advice on Habitats Regulation Appraisal*. Letter to Marine Scotland 31 Aug 2010, Ref CNS REN OSWF NNG.
- SNH (Scottish Natural Heritage), 2011a. *Scottish Territorial Waters Offshore Wind Farms – East Coast: Second Discussion Document – Cumulative Impacts – Advice from JNCC & SNH*. Letter to Royal Haskoning, 11 Feb 2011, Ref CNS REN OSWF EAST CI.
- SNH (Scottish Natural Heritage), 2011b. *European Protected Species*. Available online from: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-species/legal-framework/habitats-directive/euro/> [accessed 22 Sep 2011].
- SNH (Scottish Natural Heritage), 2011c. *Priority Marine Features*. Available online from: <http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-biodiversity/priority-marine-features/priority-marine-features/> [accessed Sept 2011].
- SNH (Scottish Natural Heritage), 2011d. *Protected mammals – Bats*. Available online from: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-species/which-and-how/mammals/bat-protection/> [accessed 13 Dec 2011].
- Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W and Burton, N.H.K. (2012). Seabird foraging ranges as a tool for identifying candidate Marine Protected Areas. *Biological Conservation*. doi: 10.1016/j.biocon.2011.12.009.
- Russ, J., 2008. *Review of ASSI designation for bats in Northern Ireland*. Northern Ireland Environment Agency, Research and Development Series 08/09.
- Russ, J.M., Hutson, A.M., Montgomery, W.I., Racey, P.A., and Speakman, J.R., 2001. *The status of *Nathusius' pipistrelle* (*Pipistrellus nathusii*, Keyserling & Blasius, 1839) in the British Isles*. *J. Zoo.*, London (2001) 254: 91-100.

## Appendices

**Appendix 11.1: Nature Conservation Agreements and Conventions**

**Appendix 11.2: SPAs with Connectivity to Neart na Gaoithe: Screening**

**Appendix 11.3: Overview of Potential Impacts on Bats**