



Technip UK Limited

Report



Aberdeen Offshore Wind Farm Environmental Statement Chapter 10 Ornithology (Revised)

June 12



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Aberdeen Offshore Wind Farm Environmental Statement Chapter 10 Ornithology (Revised)

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Ornithology (Revised)**

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PREFACE

On 1st August 2011 Aberdeen Offshore Wind Farm Limited (AOWFL) applied to the Scottish Ministers under Section 36 of the Electricity Act 1989 (as amended), and applied for a Marine Licence under the Marine (Scotland) Act 2010 to construct, operate and decommission an offshore wind farm and deployment centre off the coast of Aberdeen, Aberdeen Offshore Wind Farm, also known as the European Offshore Wind Deployment Centre (EOWDC).

The application comprised an Environmental Statement (ES), prepared in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) and Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) and followed current best practice.

The August 2011 submission comprises the following volumes:

- Volume 1 – Non-Technical Summary
- Volume 2 – Environmental Statement
- Volume 3 – Figures
- Volume 4 – Technical Appendices
- Project Description / Rochdale Envelope
- When the ES was submitted to Marine Scotland in August 2011, it had been agreed that further information would be required in support of the application. This further information was referred to as an 'Addendum' to the ES.
- An application for an Offshore Wind Farm requires some flexibility to enable subsequent detailed design. This is particularly important in the context of the scheme to be developed as a demonstrator site. In order to carry out an environmental assessment of the project, parameters require to be defined and sufficient information provided to enable the identification of the significant effects. These parameters form the Rochdale Envelope.

At the time of defining the Rochdale Envelope (as submitted August 2011) the project engineers undertook consultation with the supply chain to understand their ambitions and likely details of their future wind turbines which were at an early stage of development. The results of this initial consultation were inevitably a reflection of the supply chain at the time, and the stated ambitions of manufacturers at the time.

In keeping with the concept of a demonstrator site, over recent months, AOWFL has engaged with global turbine suppliers who wish to demonstrate their next generation turbine technology at the AOWF site. AOWFL has commenced a formal commercial process to identify and refine the turbine supply options for the site. This process is at an early and confidential stage, however revised turbine specifications have been made available to the project by the manufacturers.

The overarching objective of the EU grant associated with AOWF, is to deploy new equipment, systems, processes and initiate R&D to improve the competitiveness of offshore wind energy production, whilst generating environmentally sound marketable electricity and to increase the supply chain capabilities in Scotland, the wider UK and Europe.

The commercial evaluation of prospective turbine suppliers who can meet the EU requirements has revealed that a number of manufacturer's turbines marginally exceed the Rochdale Envelope parameters (as submitted). These turbines would

require an adjustment to the tip height of up to 198.5m, and rotor radius of up to 86m as summarised in the table below.

Please note that the maximum dimensions are likely only to be applicable to specific wind turbine locations and are unlikely to be relevant to all 11 turbine locations. Please also note that a minimum clearance of 22m above Mean High Water Springs (MHWS) will be maintained for marine navigation.

Table 1: As submitted Rochdale Envelope and proposed adjusted Rochdale Envelope

Parameter	Rochdale Envelope as submitted	Rochdale envelope (as requested)	Differential
Tip Ht (aLAT)	Up to 195 m	Up to 198.5 m	3.5 m
Hub Ht (aLAT)	Up to 120 m	Up to 120 m	Nil (likely reduction)
Rotor radius (diameter)	Up to 75 m (150 m)	Up to 86 m (172 m)	11m (22 m)

- Environmental Statement Addendum (June 2012)
- Addenda are commonly submitted as a project evolves through time to clarify issues, or to provide additional baseline data and updated environmental assessment information. This report (Chapter 10: Ornithology - Revised) forms part of the ES Addendum.
- The June 2012 Addendum contains the following information:
 - Additional bird and marine mammal baseline data.
 - An additional visualisation from Girdleness lighthouse.
 - Results of a geo-locational study into golf courses and Round 1 offshore wind farms.
 - Requested minor adjustments to turbine dimensions which form a part of the project description information, known as the 'Rochdale Envelope'.
 - Supporting statement and representative viewpoints of landscape and visual effects taking account of the adjustments to the Rochdale Envelope and preliminary design principles.
 - Updated ornithological collision risk modelling resulting from the updated Rochdale Envelope, updated ornithological impact assessment, and updated Habitats Regulations Assessment.

Where to View the Consent Application

The ES addendum submission may be viewed at the following locations during normal office hours:

Vattenfall Wind Power Ltd 3 rd Floor The Tun Holyrood Edinburgh EH8 8AE	Balmedie Library Eigie Rd Balmedie AB23 8YF
Aberdeen Central Library Rosemount Viaduct Aberdeen AB25 1GW	Peterhead Library 51 St Peter Street Peterhead AB42 1QD
Ellon Library Station Road Ellon AB41 9AE	Bridge Of Don Library Scotstown Road Bridge Of Don Aberdeen AB22 8HH

The ES addendum can also be viewed at the Scottish Government Library at Victoria Quay, Edinburgh, EH6 6QQ.

OBTAINING YOUR OWN COPY OF THE ES ADDENDUM

The ES addendum is available on the Vattenfall website:

<http://www.vattenfall.co.uk/en/aberdeen-bay.htm>

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10.0 ORNITHOLOGY

10.1 Introduction

- 1 The Ornithological Baseline and Impact Assessment report provides a detailed assessment of the potential impacts and possible effects on the birds present within the proposed Aberdeen Offshore Wind Farm also known as European Offshore Wind Deployment Centre (EOWDC) area. Hereafter referred to as EOWDC. The assessment is based on the findings from site specific bird surveys undertaken to help inform the impact assessment along with desk-based studies using published data from existing offshore wind farms.
- 2 This chapter provides a condensed summary of the findings presented in the *Ornithological Baseline and Impact Assessment Addendum* (July 2012), which should be referred to for further information. Genesis carried out the ornithological assessment.

10.2 Data Information and Sources

- 3 Three different types of surveys have been undertaken since 2005 in order to obtain a representative sample of bird data to inform the EIA and, if required, a Habitats Regulations Appraisal.
- 4 Monthly boat-based surveys were undertaken between February 2007 and April 2008 and an additional 12 months of surveys commenced in August 2010. In addition to the boat-based surveys, two years of Vantage Point surveys were undertaken from from April 2006 to March 2008 and three radar surveys were carried out in October 2005, April 2006 and April 2010.
- 5 The data obtained from these surveys along with additional information from other offshore wind farms have been used to help inform the Environmental Impact Assessment (EIA).

10.2.1 Boat-based Surveys

- 6 There have been two periods of boat-based bird surveys undertaken in support of the proposed development.
- 7 Between February 2007 and April 2008 boat-based surveys were undertaken on a monthly basis. Each survey covered an area of 101.6 km², which included the then proposed development site plus a buffer zone and a control survey area located immediately to the north (Figure 10.1). The control survey area of 50.8 km² was the same size as the then proposed development site (including the buffer zone). The site proposed at the time the surveys were being undertaken represented 12 % of the total area surveyed, and 24 % of the proposed EOWDC survey area. The distance of the shoreline to the proposed EOWDC survey area varied between 0.6 km to 7 km and the control survey area between 0.5 km and 6 km. The control survey area was positioned in an area exhibiting similar physical attributes (bathymetry and seabed type) to that of the then development site (IECS 2008).

- 8 Following the completion of the Year 1 bird surveys (February 2007 – April 2008), the location and size of the proposed development was revised. Although the original boat-based surveys did cover the revised location, the potential for future monitoring was improved by using an alternative survey strategy designed for the surveys undertaken since August 2010 (Figure 10.1). Three blocks have been surveyed each month out to 25 km from the shoreline, allowing a gradient approach of potential impact areas to be used (SMRU 2011). The total area surveyed each month was 339 km², comprising of three strata: 150.8 km² (north), 82.8 km² (south) and 105.2 km² (offshore).

10.2.2 Vantage Point Surveys

- 9 Vantage Point (VP) surveys have been undertaken from a total of four sites within Aberdeen Bay over a period of two years between April 2006 and March 2008 (Figure 10.2) (EnviroCentre 2007; Alba Ecology 2008).
- 10 Watches were conducted by a single observer with binoculars and telescope for one to two hours from each VP site. Observations were carried out during daylight hours and in conditions of good visibility. Up to four surveys per month were undertaken.
- 11 A total of 235 VP surveys and 468.5 hours of surveys have been undertaken over a period of two years across four different areas of Aberdeen Bay (Table 10.1).

TABLE 10.1 Vantage Point Survey Summary

Site	No. of VP surveys	No. of Hours
Drums	43	83
Balmedie	41	82.5
Blackdog	75	153.5
Donmouth	76	149.5
Total	235	468.5

10.2.3 Bird Detection Radar Surveys

- 12 Bird Detection radar has been used on three occasions during periods predicted to be of high migration in Aberdeen Bay: October 2005, April 2006 and April 2010. Original surveys were undertaken at Easter Hatton and Drums, but later moved to Blackdog, closer to the proposed development area. The survey areas of the radar surveys are shown on Figure 10.2
- 13 Bird movements were tracked continuously up to a range of 11 km, including during periods of darkness or poor weather conditions. The radar could detect bird movements, their flight trajectory, flight speed and altitude to a height of 1.4 km.

		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bird Detection Radar	2005												
	2006												
	2007												
	2008												
	2009												
	2010												
Boat- based	2007												
	2008												
	2009												
	2010												
	2011						X2	X2					
	2012	X2			X2	X2							
Vantage Point	2006												
	2007												
	2008												

Diagram 10.1 Ornithological surveys undertaken in Aberdeen Bay 2005 – 2012

14 Diagram 10.1 outlines the survey coverage to date.

15 A summary of the main survey reports and studies used in the EIA for birds is presented below:

- Alba Ecology (2008a). Preliminary Vantage Point species accounts of seabird movements at the proposed Aberdeen Bay offshore wind farm: April – September 2007. Report for AMEC Wind Energy.
- Alba Ecology (2008b) Preliminary Vantage Point species accounts of seabird movements at the proposed Aberdeen Bay offshore wind farm: October 2007 – March 2008. Report for AMEC Wind Energy.
- EnviroCentre (2007) Preliminary vantage point species accounts of seabird movements at the proposed Aberdeen Bay offshore wind farm: April – September 2006. Report for Amex Wind Energy February 2007.
- Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds) (2007). The Birds of Scotland. The Scottish Ornithologists' Club, Aberlady.
- IECS (2008). Aberdeen Offshore Wind Farm: Ship Based Seabird Survey Results Year 1 – February 2007 to January 2008. Report to AMEC Wind Energy. Institute of Estuarine and Coastal Studies. University of Hull.
- Lewis, M., Wilson, I.J. Söhle, I., Dean, B.J. & Reid, J.B. (2008). Wintering sea ducks, divers and grebes in the UK inshore areas: Aerial surveys and shore-based counts 2006/07. JNCC Report No. 414.

- Maclean, I.M.D, Wright, L.J., Showler, D.A. and Rehfisch, M.M. (2009) A Review of Assessment Methodologies for Offshore Windfarms. British Trust for Ornithology Report Commissioned by Cowrie Ltd.
- NESBR – North-east Scotland Bird Reports. 1980 to 1997.
- Percival, S.M., Band, B. and Leeming, T. (1999). Assessing the ornithological effects of Windfarms: developing a standard methodology. Proceedings of the 21st British Wind Energy Association Conference, 161-166.
- Plonczkier, P. & Simms, I.C. (2010). Aberdeen Offshore Wind Deployment Centre bird detection radar survey. Wildlife Management Programme, report by Food and Environmental Research Agency York.
- Quick, N and Macleod, K. (2009). Aberdeen Wind Farm Data Review. Final Report prepared by SMRU Ltd for Vattenfall, Aberdeen, UK. 22p.p
- Roos, S., Humphreys, L., Wernham, C. & Burton, N. (2010). Informing Appropriate Assessment of the Pentland Firth Strategic Area leasing Round. Ornithological scoping Report. BTO. Thetford.
- Simms, I.C., Dale, M. S., Plonczkier, P., Budgey, R., Eassom, A. & Jowerr, A. (2007). A further study using Bird detection Radar for the monitoring of bird movements at the proposed Aberdeen Offshore Wind Farm. Report Commissioned by AMEC Wind.. CSL. York.
- SMRU (2011a). Aberdeen Wind Farm Year 1 Data Analysis. SMRU Ltd
- SMRU (2011b). Aberdeen MMO and PAM boat surveys. SMRU report for Vattenfall.
- Söhle, I., Wilson, L.J., Dean, B.J., O'Brien, S.H., Webb, A. and Reid, J.B. (2006). Wintering sea ducks, divers and grebes in UK inshore areas: Aerial surveys and shore-based counts 2005/06. JNCC Report, No. 392.
- Travers, S., Thomson, S. and Mander, L. (2008). Aberdeen Offshore Wind Farm – ship-based Marine Mammal Survey Results (February 07-January 08). Final Report ZBB706 –F- 2008. Institute of Estuarine & Coastal Studies, University of Hull. 68pp.
- Walls, R.J. Brown, M.D., Plonczkier, P. & Parnell, M. (2006). Section1: A preliminary study using Bird detection radar for the remote monitoring of bird movements at the proposed Aberdeen Offshore Wind Farm. Report Commissioned by AMEC Wind.

10.2.4 Consultation

- 16 Consultation with key stakeholders, specifically SNH, JNCC and Marine Scotland occurred at an early stage of the project in 2006 and continued throughout the scoping stage of the EOWDC and since the submission of the Environmental Statement in August 2011. Key issues raised were the

potential impacts upon birds, specifically disturbance to common scoter, velvet scoters and eiders. Displacement impacts on red-throated diver and collision impacts to Terns and Gulls also the potential adverse effects to birds from Special Protection Areas (SPAs).

10.3 Impact Assessment Methodology

- 17 Potential impacts on birds arising from the proposed development have been identified based on site specific data from Aberdeen Bay. Other published information on the birds likely to be present in the area has also been drawn upon, whenever possible, additional information from existing offshore wind farms
- 18 Three potentially significant impacts on birds have been identified:
- Collision risk: Birds are at risk of colliding with wind turbines. The level of collision depends on the location and size of the development and the species present. Species such as Auks, Divers and Scoter, fly predominantly below rotor height, whereas other species such as Gulls may fly more frequently at rotor height and therefore be at a greater risk.
 - Displacement: Birds that would otherwise use an area may avoid entering the wind farm and therefore be displaced. Birds may also be displaced if the availability of their prey is reduced or if they are disturbed by vessels associated with the proposed development. The significance of any displacement is largely dependent on the scale and duration of the impact and whether other suitable sites are available to which the birds may go should they be displaced.
 - Barrier effects: Birds may avoid flying through the proposed EOWDC and select to fly either over or around it. Should this occur then this might entail the birds flying further than would otherwise have been the case. Many species of bird have been recorded avoiding offshore wind farms, often by altering course at a distance of 1 km or more, e.g. wildfowl and gannets.
- 19 The impact assessment has been based on the above potential effects.
- 20 There are three main phases in the development of the proposed programme that have been considered whilst undertaking the impact assessment.
- Construction,
 - Operation,
 - Decommissioning.
- 21 For the purposes of this EIA an evidence based approach has been used to determine potential impacts as well as expert judgement based on the baseline information and results from studies undertaken at other offshore wind farms. An impact matrix has been used to provide a structure and consistency of approach and has been used as tool to help inform the impact assessment. The structure and content of the tables are based on those originally developed by Percival *et al.* (1999) and developed further by Maclean *et al.* (2009). However, the results from the impact matrices have

not been considered to be definitive, nor in isolation. The assessment is ultimately based on the latest published data available on potential impacts, i.e. wherever possible an evidence based approach has been adopted.

- 22 To assess the sensitivity of a species a series of definitions have been used to describe the potential nature conservation value of the species Table 10.2.

Table 10.2: Definition of sensitivity with respect to nature conservation values.

Sensitivity	Definition
Very High	Cited interest of SPAs. Cited means mentioned in the citation test for the site as a qualifying species for which the site is designated. Other species that contribute to the integrity of the SPA.
High	An impact on a local population of more than 1 % of the national population of a species. An impact on ecologically sensitive species (e.g. rare breeding birds).
Medium	Regionally important population of a species, either because of population size or distributional context, EU Birds Directive Annex 1, EU Habitats Directive priority habitat/species or Species of European Conservation Concern (SPEC) and or Wildlife and Countryside Act Schedule 1 species (if not covered above). UK BAP priority species (if not covered above).
Low	Any other species of conservation interest (e.g. species listed on the Birds of Conservation Concern not covered above).

- 23 A species' sensitivity is not just based on its nature conservation value it also depends on the sensitivity of the species to a particular impact. Further refined species specific sensitivity assessment has been undertaken in line with recommendations made in Maclean et al. (2009).

- 24 Sensitivities of species groups to particular impacts are ranked and combined with the nature conservation value to give an overall sensitivity. The main types of impact identified are:

- Collision Mortality
- Barrier effect
- Displacement (including disturbance and indirect impacts, i.e. depletion of prey)

- 25 Details on the sensitivities of each species to the potential impacts are provided in Section 3.6 of the *Ornithological Baseline and Impact Assessment Addendum*.

- 26 The potential magnitude of effect was defined for displacement and collision impacts are presented in Table 10.3 and for barrier effects in Table 10.4.

Table 10.3: Definitions for magnitude of effects for displacement and collision

Magnitude	Definition
Very High	Potential total loss or very major alteration to key elements/features of the baseline conditions such that post development character/composition/ attributes will be fundamentally changed and may be lost from the site altogether. Guide: >80% of population/habitat lost.
High	Potential for major alteration to key elements/ features of the baseline (pre- development) conditions such that post development character/composition/attributes will be fundamentally changed. Guide: 20-80% of population/habitat lost.
Medium	Potential for loss or alteration to one or more key elements/features of the baseline conditions such that post development character/ composition/ attributes of baseline will be partially changed. Guide: 5-20% of population/habitat lost.
Low	Potential for a minor shift away from baseline conditions. Change arising from the loss/ alteration will be discernible but underlying character/ composition/ attributes of baseline condition will be similar to pre-development circumstances/patterns. Guide: 1-5% of population/habitat lost.
Negligible	Potential for a very slight change from baseline condition. Change barely distinguishable, approximate to the “no change” situation. Guide: <1% of population/habitat lost.

Table 10.4: Definitions for magnitude of effects for barrier effects

Magnitude of impact	Definition
Very High	(i) Wind farm is located between breeding site and key foraging area of a species flying through the site in nationally or internationally important numbers and/or (ii) is located close to key stopover, breeding or wintering site of species flying through the site in internationally important numbers and/or (iii) is located along the migration route of a species flying through the site in internationally important numbers.
High	(i) Wind farm is located close to key stopover, breeding or wintering site of species flying through the site in nationally important numbers and/or (ii) is located along the migration route of a species flying through the site in nationally important numbers.
Medium	(i) Wind farm is located between breeding site and key foraging area of a species flying through the site in regionally important numbers (ii) is located close to key stopover, breeding or wintering site of a species flying through the site in nationally important numbers (ii) Is located along the migration route of a species flying through the site in regionally important numbers.
Low	(i) Wind farm is located between breeding site and key foraging area of any other breeding species and/or (ii) is located close to a key stopover, breeding or wintering site of any other species and/or (iii) likely to be located on a migration route of any other species.
Negligible	None of the above

27 By considering the overall sensitivity of a species with the potential magnitude of the impact, an indicative overall sensitivity of the species to the potential impact is obtained (Table 10.5 and 10.6). However, it is recognised that this is only an indicative sensitivity and evidence from existing wind farms and

consequently expert judgement is used to determine whether the potential impact is likely to be significant or adverse.

Table 10.5 Potential Significance of Impact

Magnitude	Overall Sensitivity of Receptor			
	Very High	High	Medium	Low
Very High	Major	Major	Major	Moderate
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Table 10.6: Definitions of significance

Major	Population level effects will be detectable and have the potential to cause a significant effect or an adverse effect on the conservation status of the qualifying species.
Moderate	Population level effects will be detectable and have the potential to cause an effect on the population or the conservation status of the qualifying species.
Minor	Changes in the population may be detectable but not likely to cause significant effects on the population of the species or its conservation status.
Negligible	No detectable changes in the populations and no likely significant effects on the conservation status of qualifying species. The potential impact is not of concern.

10.3.1 Designated Sites

28 Although the proposed site does not lie within a designated area, there are a number of SPAs along the east coast of Scotland that have the potential to be impacted by the proposed development. For the purposes of the EIA, qualifying species from SPAs within the mean maximum foraging range of breeding seabirds have been considered and assessed against the relevant Conservation Objectives. For species outwith the breeding season, SPAs hosting qualifying species identified as having potential moderate or high levels of connectivity as advised by SNH in their response to the application have been selected. The designated sites considered within this assessment are presented in Table 3.1 of the *Ornithological Baseline and Impact Assessment Addendum*.

10.3.2 Implications of Significance

29 Where the potential significance is identified as being negligible or minor, the effect will not be significant. A finding of moderate significance has the potential to be either significant or not significant. A moderate finding will be subject to a further detailed review to determine whether or not the effect would be significant in terms of the Regulations or not. A finding of major significance will result in a significant effect in terms of the Regulations.

- 30 It should be noted that the significance derived at is only a guide and the final conclusions of the impact assessment for each species is drawn upon the currently available evidence for each species.

10.3.3 Determining Potential Adverse Effects

- 31 To determine potential adverse effects the assessment is based on the Conservation Objectives and qualifying species of the site.
- 32 To identify whether an impact is potentially adverse with respect to potential impacts on population levels a measure based upon the 1 % of baseline mortality rate has been used as a guide. It is recognised that for populations that may not be in favourable status an increase in baseline mortality rate of less than 1% may still cause an adverse effect. It is not considered to be a definitive 'cut-off' but a tool to indicate whether the potential impact could cause an adverse effect and is considered alongside other factors such as the conservation status of the species.

10.3.4 Assessment of Cumulative Impacts

- 33 The cumulative impact assessment considers all other industries which have the potential to impact on the birds that may be present at the proposed development location, these include:
- offshore wind farms
 - shipping
 - aggregates
 - dredging
 - oil and gas
- 34 Offshore renewable projects that have been identified as having the potential for a cumulative effect include two developments in the Moray Firth and three in the Firth of Forth. The sites in the Moray Firth are approximately 150 km to the north and those in the Firth of Forth approximately 120 km to the south of the proposed development.
- 35 The construction of the proposed EOWDC may overlap with construction activities being undertaken at other planned developments. With the exception of the proposed Beatrice Offshore Wind Farm, there is sparse information available to incorporate into any impact assessment, which limits the effectiveness of cumulative assessments considering conceptual projects yet to be subject to a formal consent application and for which no environmental or design data are currently available.
- 36 There are numerous onshore wind farms in Aberdeenshire and there is the potential for cumulative impacts from these developments on certain species that occur both onshore and offshore, e.g. Geese and Gulls. Where relevant information is available these potential impacts have also been considered.
- 37 Therefore, the cumulative impact assessment can only be undertaken with data available from the currently operating Beatrice demonstrator project and proposed Beatrice offshore wind farm in the Moray Firth. Although, the

assessment does wherever possible consider potential cumulative impacts from other renewable projects for which no applications have been made.

- 38 Shipping associated with the harbour, which has been undertaken in Aberdeen Bay over many centuries with currently approximately 16,000 vessel movements per year. There are no known plans that are likely to cause a significant increase in the level of shipping currently being undertaken in Aberdeen Bay and any impacts shipping may currently be having on the birds within Aberdeen Bay will be part of the baseline.
- 39 There are no aggregate activities within Aberdeen Bay. There are no licensed dredging sites within Aberdeen Bay but occasional dredging of the harbour may occur, with the next dredging scheduled for 2012.
- 40 Aside from shipping there are no oil and gas related activities within Aberdeen Bay.

10.3.5 Assessment of In-combination Impacts

- 41 The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended) require that a Habitats Regulations Appraisal (HRA) must be conducted by a competent authority. The HRA considers the implications for European sites in view of the European sites conservation objectives, in respect of any plan or project which is not directly connected with or necessary to the management of the European site for conservation purposes and which is likely to have a significant effect on the European site either alone or in-combination with other plans or projects.
- 42 Therefore the term 'in-combination' will be used when considering the impacts of the proposals with other plans or projects on European sites.
- 43 The main industries considered for potential in-combination impacts are proposed offshore wind farms, aggregate industry, dredging, oil and gas and shipping. Of these, proposed offshore wind farms and shipping are the only activities identified for which there is a potential for an in-combination impact.

10.4 Baseline Assessment

- 44 Detailed information on the baseline is presented for each species in Section 4 of the *Ornithological Baseline and Impact Assessment Addendum* and this should be referred to for further information. Below is a brief summary of the species recorded.
- 45 The ornithological environmental baseline draws upon results from project specific surveys undertaken to inform the EIA and existing published information on the birds present in the wider area, e.g. North-east Scotland Bird reports.
- 46 A total of 40 species of seabird and wildfowl have been recorded from site specific surveys, of which 37 species are either a qualifying species for a SPA or were recorded in numbers that could be of concern should there be an impact and were therefore further assessed. Those identified during consultation as being of particular concern are summarised below:

Pink-footed goose: Pink-footed geese were occasionally recorded in Aberdeen Bay during migration periods. Numbers recorded were generally low with no significant migration detected. The majority of birds were recorded flying above 30 m and most sightings were of birds within 2 km from shore.

Barnacle goose: Barnacle geese were the most frequently recorded goose in Aberdeen Bay where large numbers were recorded passing through the bay during September 2006 and on one date in October 2007. Relatively few barnacle geese were recorded outwith these peak periods. No geese were reported as having landed in the bay. Land based observations recorded the majority of birds within 2 km from shore but there were sightings out to at least 3 km. Of those birds recorded in flight from boat-based surveys, 6 were flying above 25 m but below 200 m. Land-based observations recorded all barnacle geese as flying below 35 m.

Common eider: The Ythan Estuary and Aberdeen Bay are both important areas for eider throughout the year. The Ythan Estuary is the largest breeding colony of eider in the UK and Aberdeen Bay holds nationally important numbers, particularly during the post-breeding period of July and August. The results from boat-based surveys recorded relatively few eider, with peak numbers during the autumn periods. In Year 1 and Year 2, no eider were recorded within transect in either the proposed EOWDC area or the 'control' area between May and July. Peak densities occur during September. Data from land-based observations recorded peak numbers of eider between December and April with a peak, in April, of up to 32 birds per hour passing across the bay. Eider were recorded out to at least 3 km from shore but a significant majority of sightings were within 1 km from shore. All those recorded in flight from boat-based surveys were flying below 25 m and of those recorded from shore more than 96% were flying below 30 metres. The breeding population on the Ythan Estuary and the number of birds using Aberdeen Bay are of national importance.

Common scoter: Common scoters were frequently recorded throughout the year during surveys undertaken across Aberdeen Bay. Peak numbers recorded during boat-based surveys were during the spring and summer months with most records from within the proposed EOWDC survey area. Land based surveys recorded peak numbers of common scoter during the summer months with most birds being recorded off Blackdog. Most common scoter were recorded within 2 km of the coast and in waters of less than 10 m. However, a survey undertaken in April recorded the majority of common scoter off Blackdog as being between 1 km and 3 km from shore. Peak counts of common scoter recorded within Aberdeen Bay are of national importance but are not of international importance.

Velvet scoter: Velvet scoter were only occasionally recorded throughout the year during surveys undertaken across Aberdeen Bay. A total of fourteen velvet scoter were recorded from boat-based surveys and a peak from shore-based counts occurred in June. Most velvet scoter were recorded between 1 km and 3 km off the coast. Of those recorded in flight all but one were recorded flying below 30 m. Although no counts during surveys undertaken across Aberdeen Bay were of national importance peak counts from Blackdog have, in the past, been of national importance.

Red-throated diver: Red-throated diver occur throughout the year in Aberdeen Bay with peak numbers occurring during the winter and spring periods. Peak numbers of red-throated diver recorded within the proposed EOWDC survey area was 93 in May 2007 and peak density of 0.9 birds/km² in February 2007. Further surveys identified potentially main areas for red-throated diver to the north of the proposed development where densities of up to 1.26 birds/km² were recorded during November 2010 and a peak population estimate of 190 individuals. Data obtained from boat-based surveys supports the findings from the vantage point and radar studies that most red-throated diver occur within 2 km of the shore and in water depths of less than ten metres. Estimated numbers of red-throated diver recorded in Aberdeen Bay were below the threshold for a site of international importance but the bay may, on occasions, hold nationally important numbers.

Fulmar: Fulmars occur throughout the year in Aberdeen Bay with peak numbers during the late summer, late winter and spring periods. Very few fulmars were recorded in nearshore waters during the post-breeding and early winter periods. Fulmars were more frequently recorded within the 'control' survey to the north and in offshore waters than within the proposed offshore EOWDC survey area, where there was a peak count of sixteen birds in February 2006. Results from the vantage point and radar studies suggest that the majority of fulmars occur between 2 - 3 km offshore and based on boat-based observations 0.6% of flights were at rotor height. The numbers recorded from boat-based and vantage point land based surveys were lower than the peak counts reported for Aberdeen Bay from other land based counts.

Gannet: Gannet occur throughout the year in Aberdeen Bay with peak numbers between June and August and relatively few records between November and April. Gannets were more frequently recorded within the 'control' area and to the north of the Ythan compared to the proposed development area. Results from the vantage point and radar studies suggest that the majority of gannets occur between 2–3 km offshore. Of those recorded in flight, 92% of all flights were below 25 m.

Cormorant: Cormorants were regularly recorded in Aberdeen Bay throughout the year. Peak numbers occurred in the spring and autumn with most sightings within the 'control' area. Peak abundance of 31 birds and a density of 0.61 birds/km² occurred in the 'control' area during the spring. The majority of sightings were within 2 km of the coast and of those recorded in flight from land, 85% of all flights were below 30 m

Shag: Although shags were recorded regularly in Aberdeen Bay throughout the year numbers were generally low. Peak numbers occurred in the autumn with most sightings within 2 km from the shore.

Kittiwake: Kittiwakes were recorded throughout Aberdeen Bay in highly seasonally variable numbers. During the winter periods very few kittiwakes were recorded. However during the breeding season kittiwakes were frequently recorded with estimated populations within the 'control' area during this period of 1,676 birds and 663 birds in the proposed EOWDC development area. Peak densities of 33 birds/km² were recorded to the north of the proposed development during the summer months. Land-based observations also recorded peak numbers during the summer months with a

peak in July. Of those for which flight height was recorded from boat-based surveys, 18.5% were greater than 25 m above the sea surface.

Herring gull: Herring gulls were recorded throughout the year with peak numbers from boat-based surveys during June and July and relatively few records during other times of year. Land-based observations recorded higher numbers of herring gulls than the boat-based surveys in particular during the winter and spring periods when lower numbers were recorded offshore.

The majority of sightings were within 3 km of the coast with smaller numbers beyond 2 km from the shore. Of those recorded in flight from land based observations up to 48% were recorded flying between 30 m and 150 m.

Great black-backed gull: Great black-backed gulls were recorded in relatively low numbers throughout the year. Peak counts occurred during the winter periods. Land-based observations also recorded a slight peak in numbers during June and August but not many more than during the winter period. Of those for which flight height was recorded from land, 40% were within 30 - 150 m of the sea surface.

Little tern: Very few little terns were recorded from any of the surveys undertaken during the study. There were no sightings from boat-based surveys and only 17 little terns over two years of vantage point surveys undertaken between April 2006 and March 2008. All sightings were of birds flying below 30 m.

Sandwich tern: Relatively few Sandwich terns were recorded from boat-based surveys undertaken in Aberdeen Bay. A total of five birds were recorded in the proposed EOWDC site during the breeding season in the first Years data and none during the Year 2 surveys. Peak numbers from boat-based surveys were in May and July with no records in August when relatively high numbers were recorded from land-based observations. The majority of sightings were within 500 m from shore with few sightings of birds beyond 2 km. Of those recorded in flight from shore, 44% of Sandwich terns were flying between 30 - 150 m but 5.7% were recorded flying above 25 m from boat-based surveys.

Common tern: Numbers of common terns from boat-based surveys peaked during May and July. Although land-based observations indicate that the timing of peak counts varied between years with some occurring in May and others in July and August when up to 50 birds per hour were recorded.

Arctic tern: Numbers of Arctic terns recorded from boat-based surveys in Year 1 was very low but they were regularly recorded during Year 2 surveys and from land-based counts between April through to October with peak counts during July. Numbers recorded from land based observations varied but were generally less than 10 birds per hour with one exceptional count of 150 birds per hour in July 2008. The majority of sightings were within 2 km of the coast and 36% of all sightings from land were of birds flying above 30 m.

Guillemot: Guillemots were recorded widely across Aberdeen Bay from all surveys. Data from boat-based surveys indicate peak counts in the bay occur during the post-breeding period with highest densities recorded offshore during this period. Within the proposed EOWDC densities were greatest during September. Relatively high numbers remain within the area until

November after which numbers of guillemots in the area decrease. Land based observations recorded peak numbers during April. Data from boat-based surveys recorded guillemots widely across the surveyed areas and land-based observations recorded most guillemots from between 1.5 km and 4.5 km from the coast.

Razorbill: Razorbills were widely recorded across Aberdeen Bay from all surveys. Low numbers were present at the beginning of the year but increased from April onwards. Data from boat-based surveys indicate peak counts in the bay between July and September but also a high count in October. Land based observations recorded peak numbers during April and September. Data from boat-based surveys recorded razorbills widely across the surveyed areas and land-based observations recorded most birds from between 2.0 km and 4.0 km from the coast. All but one razorbill recorded in flight from boat-based surveys were flying below 25 m.

Puffin: Puffins were widely recorded across Aberdeen Bay from all surveys. No puffins were recorded between December and March and relatively low numbers were recorded until July when the number of puffins recorded increased with a peak during the post-breeding period. Peak numbers of puffins during July and September were recorded within the 'control' area whereas in August and October peak numbers were within the proposed development area. Of those recorded in flight, all puffins recorded during boat-based and land-based surveys were recorded as flying below 30 m.

10.5 Impact Assessment

- 47 Details of the findings of the impact assessment undertaken for each species can be found in Section 4 of the *Ornithological Baseline and Impact Assessment Addendum*. Table 10.3 provides a summary of the key findings.

10.6 Impact Assessment - Revised

TABLE 10.7 Summary of Impact Assessments									
Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level	Mitigation	Residual impacts	Monitoring
Construction									
Displacement	Displacement away from the area by presence of construction vessels	High	Negligible to Low for more sensitive species, e.g. red-throated diver.	Temporary Short to Medium term	Species dependent. Potentially up to 2 km for some species such as red-throated diver and common scoter	Negligible to minor for red-throated diver	Minimise vessel movements and use existing shipping routes as far as practicable.	Localised temporary displacement	Reporting protocol
Sound (piling)	Reduction in availability of prey species due to displacement away from sound source or increased mortality	High	Negligible	Temporary Short to medium term	Species dependent. Local.	Negligible to Minor for Terns, Auks and Divers	Minimise as far as practicable significant piling operations during periods of high seabird sensitivity	Displacement away from construction area.	Tern breeding colony monitoring and boat-based bird surveys.
Operation									
Collision with turbines	Increased mortality	Negligible to Low	Negligible	Long-term	Local	Negligible to Minor	None	Possible collision mortality	If practicable, possible land-based surveys or

TABLE 10.7 Summary of Impact Assessments									
Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level	Mitigation	Residual impacts	Monitoring
									use of offshore surveys
Lighting of turbines	Passerines and other birds may be attracted to the turbines.	Negligible	Negligible	Long-term	Local	Negligible	Minimise use of lights as far as practicable	Possible collision mortality	None
Barrier effect	Increased distances flown causes increased energetic expenditure	High	Negligible	Long-term	Local	Negligible to Minor for eider and red-throated diver	None	Potential increase in energetic expenditure	If practicable possible land based surveys to assess flight lines
Displacement	Displacement away from area by presence of turbines	High	Negligible to Low for red-throated diver	Long-term	Local to out to 2 km	Negligible to Minor	Minimise as far as practicable the footprint of the development	Localised displacement of red-throated diver.	Offshore surveys and if practicable land based surveys
Displacement	Displacement away from the area by disturbance from maintenance vessels	High	Negligible	Long-term	Local	Negligible to Minor	Minimise vessel movements and use existing shipping routes as far as practicable.	Localised temporary displacement	Reporting protocol
Decommissioning									
Disturbance	Displacement away from the area by	High	Negligible	Short to Medium-term	Local	Negligible to Minor	Minimise vessel movements	Localised temporary displacement	Reporting protocol

TABLE 10.7 Summary of Impact Assessments									
Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level	Mitigation	Residual impacts	Monitoring
	presence of decommissioning vessels						and use existing shipping routes as far as practicable.		

10.6.1 Mitigation

- 48 Detailed mitigation measures would be further developed to avoid, remove or reduce any potentially significant impacts during consultation with the Regulator and their statutory advisors and other stakeholders.
- 49 The main potential impacts arising from the proposed development relate primarily to direct or indirect displacement effects on Divers and Terns. Mitigation measures that may be considered as measures to help avoid, remove or reduce them include:
- 50 *Minimising the proposed development area:* By reducing as far as practicable the overall area of the proposed development at the earlier design stage of the proposed EOWDC, the total area and consequently the total number of red-throated divers or other species that may be displaced has been minimised.
- 51 *Vessel management plans:* The potential disturbance of seabird and Divers and other seabirds from the proposed development area by vessels may be reduced by minimising the number vessels used and by ensuring that all vessels, as far as practicable, use the existing shipping lanes.
- 52 *Foundation types:* The use of monopiles may require the use of pile-driving to install them. By selecting alternative foundation types, there is the potential to reduce the risk of an impact on the prey species and therefore reduce the possibility of a displacement effect being caused by construction activities.
- 53 *Timing and duration of installation:* The timing and duration of installation have still to be determined. Although it may not be possible to select a period for construction activities to take place that is of lower sensitivity. It would be taken into consideration when developing potential project schedules.
- 54 *Minimising aviation and navigation lighting:* Birds can be attracted to bright lights, e.g. lighthouses, particularly during poor weather conditions. In order to reduce the risk of birds being attracted to the proposed development all lighting would be kept as far as practicable to a minimum but still kept within the requirements to ensure safety.

10.6.2 Monitoring

- 55 It is essential that any monitoring undertaken is designed to address specific concerns or potential impacts identified during the EIA process. Poorly designed ad hoc monitoring is likely to be inefficient and not provide useful or meaningful results. It is therefore important that any monitoring programme is developed in collaboration with the Regulator and statutory advisors and takes note of key stakeholders comments arising from the consultation period. In order to facilitate the delivery of research a steering group will be formed and managed by an R&D manager. Specialist working groups will provide the detailed technical competences supporting the R&D.
- 56 Future research and monitoring will be agreed through the R&D working group but potential monitoring and research includes:
- Collision risk studies on birds;
 - Tagging and tracking studies of seabirds to and from breeding colonies and outwith the breeding season to look at barrier effects;

- Specific studies aimed at determining potential changes in bird distribution, i.e. displacement or attractant effects;
- Studies looking at potential secondary impacts on prey species, e.g. changes in prey fish and benthic distributions.

57 Further discussions will help develop these and other ideas into meaningful projects from which useful results will be obtained.

58 A detailed monitoring programme aimed at specific issues or concerns would be developed with the Regulator and advisors should consent be granted.

10.7 Summary

59 Site specific boat-based and land based surveys undertaken in Aberdeen Bay identified 36 species of seabird or wildfowl that were considered as being at potential risk of being impacted by the proposed development. Three possible impacts were identified: collision, displacement and barrier effects. A detailed impact assessment undertaken indicated that for most species the proposed EOWDC is only likely to have a negligible or, at worse, a minor effect on the species present. However, for red-throated diver the possible effect was considered to be of potentially moderate significance due to the potential displacement effects arising from the presence of the turbines. However, red-throated divers occur widely in Aberdeen Bay and there is potential for displaced birds to relocate elsewhere. Furthermore, peak numbers of red-throated diver occur during periods of passage and therefore displacement impacts are temporary. Consequently, the effect of displacement on red-throated diver is considered to be minor and not significant.

60 Mitigation measures to reduce any impacts as far as practicable would be developed through consultation with the Regulator, statutory advisors and key stakeholders.

61 A detailed monitoring programme would be developed in conjunction with the Regulator and statutory advisors.

62 Information to Inform a Habitats Regulations Appraisal (HRA) with respect to birds can be found in the revised HRA addendum (June 2012).