



**MAINSTREAM**  
RENEWABLE  
POWER

## Neart na Gaoithe Offshore Wind Farm

### Addendum of Supplementary Environmental Information

June 2013

Document Release and Authorisation Record			
<b>Mainstream Renewable Power Document</b> <b>Ref:Fugro EMU Job No:</b> <b>Fugro EMU Report No:</b> <b>Date:</b> <b>Client Name:</b> <b>Client Contact(s):</b>	UK02-0504-0158-EMU-ADDENDUM-RPT-A3 J/1/06/2136 13/J/1/06/2136/1515 7 June 2013 Mainstream Renewable Power Ewan Walker		
	Name	Signature	Date
<b>Fugro EMU Project Managers</b>	Alison Duncan Emma Heywood		03/06/13
<b>Report written by</b>	Mainstream Renewable Power Fugro EMU Limited		07/06/13 13/06/13
<b>Report Q-A by</b>	Mainstream Renewable Power Fugro EMU Limited		03/06/13 07/06/13
<b>Report authorised by</b>	Mark Gibson, Fugro EMU Ewan Walker, MRP		03/06/13 07/06/13

## Executive Summary

An application for consent to build and operate the Neart na Gaoithe offshore wind farm was submitted to Marine Scotland in July 2012. The application was accompanied by an Environmental Statement (ES) which summarised the findings of a detailed Environmental Impact Assessment (EIA).

To address comments raised during consultation, a number of refinements to the original Design Envelope have been made. This Addendum of Supplementary Environmental Information has been prepared to present these Design Envelope refinements and their environmental implications.

The key refinements are as follows:

- Fewer turbines – the original Design Envelope comprised a maximum of 125 turbines, which has now been reduced to a maximum of 90 turbines; and
- Increased minimum rotor height (the air gap or clearance between sea level and lowest blade tip)

The above changes have resulted in lower collision risk for a number of bird species and the results of revised impact assessments are presented in this document. Assessments include an additional third year of bird survey data which was collected subsequent to the completion of the Environmental Statement and which provides a greater level of certainty for assessments.

Further to the above, requests for clarification on a number of topics were submitted during consultation. Work has been undertaken to address these requests with outputs presented as appendices to this document. These include:

- New and updated Habitats Regulations Appraisal (HRA) information for Special Protection Areas (SPAs) and Special Areas of Conservation (SACs);
- Revised visualisations to reflect an updated single indicative layout;
- Further discussion regarding potential cumulative visual impacts;
- Lighting information, including additional information on likely visibility from shore; and
- Additional information regarding electro-magnetic fields from subsea cables.

## Table of Contents

<b>1</b>	<b>Section A: Introduction and Background .....</b>	<b>3</b>
1.1	Introduction .....	3
<b>2</b>	<b>Section B: The Refined Design Envelope .....</b>	<b>4</b>
2.1	The Original Design (Rochdale) Envelope .....	4
2.2	The Refined Design Envelope.....	4
<b>3</b>	<b>Section C: Supplementary Environmental Information .....</b>	<b>8</b>
3.1	Implications of the Refined Design Envelope .....	8
3.2	Supplementary Environmental Information .....	11
<b>4</b>	<b>Section D: Supporting Appendices.....</b>	<b>15</b>
-	Technical Appendix 1: Refined Design Envelope	
-	Ornithology Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithological Technical Report, May 2013	
-	Ornithology Appendix 2: Collision Rate Estimates of Seabirds at Neart na Gaoithe	
-	Ornithology Appendix 3: Habitats Regulation Appraisal (Special Protection Areas)	
-	Marine Mammals Appendix 1: Habitats Regulation Appraisal (Marine Mammal Special Areas of Conservation)	
-	Fish and Shellfish Ecology Appendix 1: Habitats Regulation Appraisal (Salmonid Special Areas of Conservation)	
-	Fish and Shellfish Ecology Appendix 2: High Voltage Alternating Current Electro-Magnetic Field Studies	
-	Military and Aviation Appendix 1: Proposed Scheme of Aviation and Maritime Marking and Lighting Scheme	
-	Seascape, Landscape and Visual Impact Assessment Appendix 1: Visualisations	
-	Seascape, Landscape and Visual Impact Assessment Appendix 2: Seascape, Landscape and Visual Impact Assessment Addendum	

## Table of Tables

<i>Table 1: Summary of refined Design Envelope parameters (refer to Technical Appendix 1: Refined Design Envelope for full detailed parameters) .....</i>	<i>6</i>
<i>Table 2: Summary of implications of Design Envelope refinement .....</i>	<i>8</i>
<i>Table 3: Summary of Supplementary Environmental Information presented in this Addendum.....</i>	<i>11</i>
<i>Table 4: List of appendices forming part of the Addendum of Supplementary Environmental Information ..</i>	<i>15</i>

## 1 Section A: Introduction and Background

### 1.1 Introduction

- 1 In July 2012, Neart na Gaoithe Offshore Wind Limited (NnGOWL) submitted applications for consent under Section 36 of the Electricity Act 1989 and Marine Licences under the Marine (Scotland) Act 2010 to construct and operate the proposed Neart na Gaoithe offshore wind farm. The applications were submitted to Marine Scotland with an accompanying Environmental Statement (ES). Following the application, NnGOWL has refined certain parameters of the Design Envelope (referred to previously as the Rochdale Envelope, see Section 1.1.3: Key Terminology Change) for the offshore wind farm upon which the original ES assessments were based.
- 2 This document and associated appendices constitute Further Information submitted pursuant to the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 and the Marine Works (Environmental Impact Assessment) Regulations 2007 and form an Addendum of Supplementary Environmental Information to the NnGOWL ES submitted in July 2012. This Addendum provides a description of the components of the Design Envelope which have been refined, discusses the implications of the refinement of the Design Envelope for the assessment conclusions as detailed in the ES and presents supplementary information, including a revised assessment of impacts on ornithology.

#### 1.1.1 Aim of the Document

- 3 This Addendum of Supplementary Environmental Information has two aims:
  - To provide clarity to those Design Envelope parameters which have been altered and, where necessary, present updated assessments; and
  - To present supplementary environmental information requested by consultees.

#### 1.1.2 Approach and Document Layout

- 4 The document comprises the following sections and supporting appendices:
  - Section A: Introduction and Background;
  - Section B: The Refined Design Envelope;
  - Section C: Supplementary Environmental Information; and
  - Section D: Supporting Appendices.

#### 1.1.3 Key Terminology Change

- 5 In response to a number of comments received during consultation, the term 'Rochdale Envelope' has been replaced with 'Design Envelope'.
- 6 The Design Envelope describes the different technical parameters of the development. The Design Envelope is provided in full in Technical Appendix 1: Refined Design Envelope.

## 2 Section B: The Refined Design Envelope

7 The refined Design Envelope parameters reflect changes to wind farm indicative layout, foundation design, wind turbine specifications and technical specifications of the inter-array and export cables. The Design Envelope parameters which have been refined are described in Section 2.2 below. The complete refined Design Envelope (incorporating changes since the original submission) is provided in Technical Appendix 1: Refined Design Envelope.

### 2.1 The Original Design (Rochdale) Envelope

8 As described in the ES, Chapter 1: Introduction to the Neart na Gaoithe Proposed Offshore Wind Farm Development, the proposed Neart na Gaoithe offshore wind farm is located to the northeast of the Firth of Forth, 15.5 km east of Fife Ness. The proposed wind farm will cover an area of approximately 105 km<sup>2</sup>, and was described in the original Design Envelope in July 2012 as comprising between 64 and 125 turbines, with a maximum generation capacity of 450 MW.

9 Turbines with a rated output of between 3.6 MW and 7 MW were being considered for Neart na Gaoithe when the consent application was submitted in July 2012. Two indicative wind farm layouts were included in the July 2012 submission.

10 In addition to the turbines, four potential offshore substation locations were identified with the intention of using a maximum of two of these sites. A meteorological mast was intended to be installed on site in advance of the main project; to be covered by a separate consent application.

11 An estimated 175 km of subsea cables were proposed. The inter-array cables were proposed to be arranged in a string formation linking groups of turbines to each other and to the offshore substation(s). A pair of export cables was proposed from the offshore substation to the landfall at Thorntonloch.

12 Chapter 5: Project Description (Section 5.15) describes the original Rochdale Envelope in more detail and is available to download [here](#)<sup>1</sup>.

#### 2.1.1 Reasons for the Design Envelope Refinement

13 Since the submission of the consent application and associated ES in July 2012, NnGOWL has been working to refine the Design Envelope in order to mitigate potential environmental effects, to address comments raised during consultation and to commence the procurement process.

14 This work also provides greater clarity for consultees by reducing the number of development scenarios.

## 2.2 The Refined Design Envelope

### 2.2.1 Description of the Refinement

15 This section describes specifically the areas where parameters have been refined. **Error! Reference source not found.** below presents a summary of all refined design parameters. The maximum value as described in the original Design Envelope is also detailed to illustrate the extent of the change.

16 The full Design Envelope is presented in Technical Appendix 1: Refined Design Envelope Parameters.

<sup>1</sup> <http://mainstream-downloads.opendebate.co.uk/downloads/Chapter-5---Project-Description.pdf>

### 2.2.1.1 Turbine Selection

- 17 The key change to the Design Envelope concerns the refinement of turbine options. Originally turbines with a rated output of between 3.6 MW and 7 MW were under consideration. Since the submission of the ES, only turbines with a rated output of between 5 MW and 6.15 MW are being considered.
- 18 This change has reduced the number of potential development scenarios available. It has also resulted in a reduction in the maximum number of turbines from 125 to 90.

### 2.2.1.2 Turbine Minimum Rotor Heights

- 19 The minimum rotor height or clearance between sea level and lowest blade tip (also known as the 'air gap'), has been increased since the submission of the Environmental Statement. From 26 metres in the Environmental Statement, the minimum rotor height has now been increased to 30.5 metres. This design change has been undertaken specifically to reduce the potential for impacts on some bird species.
- 20 It should be noted that the *maximum* rotor height (or tip height) of 197 metres remains unchanged from the Environmental Statement.

### 2.2.1.3 Turbine Layouts

- 21 Indicative turbine layouts were included in the ES submitted in July 2012. These indicative layouts were intended to assist in identifying the likely significant effects of the proposed development and were not presented as final layouts.
- 22 The two original indicative layouts represented the range of potential turbine locations within the development area. Layout A provided an indicative layout for the 3.6 MW and 4.1 MW turbine options and Layout B provided an indicative layout of the larger rated turbines of between 5 MW and 7 MW. As the smallest and largest turbines have now been removed from the Design Envelope, these original layouts are replaced by a single indicative layout capable of accommodating all turbines now under consideration.
- 23 The final turbine layout will not be determined until all preconstruction geotechnical surveys have been completed. The final layout will be submitted to Marine Scotland before commencement of construction pursuant to the Marine Licences and a 500 m micro-siting allowance will be applied to that final layout to account for localised ground conditions. The final layout incorporating the micro-siting allowance requested, will fall within the Design Envelope parameters presented in Technical Appendix 1: Refined Design Envelope.

### 2.2.1.4 Foundation Parameters

- 24 Two foundation types were assessed in the ES; gravity base foundations and steel jackets. Both remain part of the refined Design Envelope, however greater clarity is now available regarding the parameters for each. For example, the minimum leg spacing for steel jackets has increased and the maximum footprint for gravity bases is now less than assessed in the ES. Details can be viewed in Table 2.1.
- 25 Related to this, requirements for jack-up vessels used during construction are now more specific due to the refined Design Envelope. The maximum number of spud cans per vessel is now lower than assumed for the ES.

### 2.2.1.5 Inter-Array and Export Cables

- 26 Reducing the maximum number of turbines has also resulted in a reduced maximum length of inter-array cable required.
- 27 Geotechnical surveys undertaken subsequent to the consent application have also given greater clarity regarding potential cable burial depth. Burial depth estimates of up to 1.5 m were assumed for inter-array cables in the ES assessments however it is now anticipated that up to 3 m will be possible.
- 28 Additionally, minor changes to the cable technical description have been made following the procurement process, including the addition of an alternative cable casing and cross sectional area.
- 29 The length and number of export cables required remains unchanged.

### 2.2.2 Summary of the Revised Parameters

30 The refined Design Envelope is summarised in Table 1 below.

Table 1: Summary of refined Design Envelope parameters (refer to Technical Appendix 1: Refined Design Envelope for full detailed parameters)

Design element	Parameter	5 MW	6 MW	6.15 MW	Maximum in original Design Envelope
<b>Turbines</b>	Maximum number	90	75	73	125
	Rotor diameter (m)	135 m	154 m	126 m or 152 m	164 m
	Minimum hub height (m) LAT	93.5			80.25 m
	Maximum hub height (m) LAT	107.5			115 m
	Air gap (m) clearance to blade tip (minimum of) from LAT	30.5			26 m
	Revolutions per minute(rpm)	6.9-13.5	5-11	6.4-12.1	18
	Speed at blade tip (m/s)	46.6-95.4 m/s	80 m/s (nominal)	80 m/s (maximum)	113.04 m/s (maximum)
	Turbine layout	A single indicative layout has been created that can accommodate turbine sizes between 5 MW and 6.15 MW. This layout is provided in Technical Appendix 1: Refined Design Envelope.			Two indicative layouts (indicative layout A and B) were in original Design Envelope.
<b>Offshore substation</b>	Colour	Yellow (RAL 1023) up to underside of platform then grey (RAL 7035).			Yellow to underside of platform then grey.
<b>Jacket foundations</b>	Jacket leg spacing at seabed level (m x m)	20 x 20 m – 35 x 35 m			15 x 15 m – 35 x 35 m
	Number of spud cans	3-6			4-8
<b>Gravity base foundations</b>	Area of foundation footprint (m <sup>2</sup> )	650-1400 m <sup>2</sup>			300-1600 m <sup>2</sup>
	Foundation footprint diameter (m)	29-42 m			20-45 m
	Quantity of material dredged (m <sup>3</sup> )	Total: 365,000 m <sup>3</sup> Average per foundation: 4,000 m <sup>3</sup>			Approximately 320,000 m <sup>3</sup> of material dredged over entire site. Average of 4,000 m <sup>3</sup> dredged per foundation. Worst case of 5,000 m <sup>3</sup> dredged per turbine foundation.
	Depth of gravel bed	The gravel beds will be an average of 1.5 m deep.			The gravel beds will be an average of 1.5 m deep. In areas of very soft sediment gravel bed could be up to 4 m deep, this is expected to be the

Design element	Parameter	5 MW	6 MW	6.15 MW	Maximum in original Design Envelope
					case in less than 5% of turbine locations.
	Foundation installation duration (dredging) days	3-6			Dredging 4-7 days, foundation placement and filling 4-7 days, scour protection placement 7-14 days.
	Foundation installation duration (placement and filling) days	4-6			
	Foundation installation duration (scour protection) days	4-8			
<b>Inter-array cables</b>	Length of cables	75-120 km			85-140 km
	Design of array	Up to 15 circuits			Up to 16 circuits
	Cable specification-material	Cross Linked Polyethylene (XLPE) or Ethylene propylene rubber (EPR).			XLPE
	Cable specification-cross-sectional area (mm <sup>2</sup> )	120-630 mm <sup>2</sup>			Size ranges from 50 mm <sup>2</sup> to 500 mm <sup>2</sup>
	Burial depth (m)	Up to 3 m			Unconfirmed, varies across the site, likely to be 1-1.5 m.
<b>Export cables</b>	Burial depth (m)	Up to 3 m			1-3 m

### 3 Section C: Supplementary Environmental Information

#### 3.1 Implications of the Refined Design Envelope

##### 3.1.1 Introduction

31 An exercise has been undertaken to identify those receptors where the assessment conclusions may be affected by the changes to the Design Envelope referred to in Section B. This is outlined below in Table 2.

##### 3.1.1 Summary of Implications for Environmental Receptors

32 Refinements to the Design Envelope parameters do not necessarily result in a corresponding change to the impact assessment conclusions and in these cases no additional assessment is considered necessary. This may be because the magnitude of effect is unaffected or the original assessment concluded no significant impact.

33 Where the original assessment concluded no significant impact and the refinement is likely to reduce the impact further, this likely reduction is noted but no new assessment has been undertaken.

Table 2: Summary of implications of Design Envelope refinement

Receptor	Overview of implications of design parameter refinement	Supplementary Information Presented
Chapter 8: Geology and Bathymetry	No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.  All impact assessments conclusions remain <b>not significant</b> .	No
Chapter 8: Water Quality		No
Chapter 9: Physical Processes		No
Chapter 10: Air Quality		No
Chapter 11: Nature Conservation	The original Nature Conservation assessment focussed on the process as required under Environmental Impact Assessment (EIA) regulations. Information is presented to satisfy the requirements under Habitats Regulations Appraisal (HRA) and this is presented in Appendix Ornithology Appendix 3: HRA (Special Protection Areas) (SPAs), Marine Mammals Appendix 1: HRA (Marine Mammal Special Areas of Conservation (SACs) and Fish and Shellfish Ecology Appendix 1: HRA (Salmonid SACs).	Yes
Chapter 12: Ornithology (including those of conservation importance)	A change in the Design Envelope to increase in the minimum rotor height has reduced Collision Risk Mortality for a number of species.  Further information is presented on the implications of the refined Design Envelope at Ornithology Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithological Technical Report, May 2013, Ornithology Appendix 2: Statistical Report and Ornithology Appendix 3: HRA (SPAs).	Yes
Chapter 13: Marine Mammals (including those of conservation importance)	Noise impacts on harbour seals only were assessed as being of <b>moderate</b> or <b>major significance</b> .  No Design Envelope refinements will affect the original impact assessment conclusions.  Further information is included to support HRA conclusions at Marine Mammal Appendix 1: HRA (Marine Mammal SACs).	No

Receptor	Overview of implications of design parameter refinement	Supplementary Information Presented
<b>Chapter 14: Benthic Ecology</b>	<p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p> <p>All impact assessment conclusions under EIA remain <b>not significant</b>.</p>	No
<b>Chapter 15: Fish and Shellfish Ecology (including those of commercial and conservation importance)</b>	<p>Following mitigation, noise impacts on herring only were assessed as being of <b>moderate significance</b>.</p> <p>No Design Envelope refinements will substantially affect the original impact assessment conclusions under EIA.</p> <p>Further information is included to support HRA conclusions at Fish and Shellfish Ecology Appendix 1: HRA (Salmonid SACs).</p>	No
<b>Chapter 16: Commercial Fisheries</b>	<p>A number of impacts on commercial fisheries receptors were assessed as being of <b>minor significance</b> or <b>not significant</b>.</p> <p>Some impacts relating to installation activities were assessed as being of <b>moderate significance</b> but anticipated to be reduced to <b>minor significance</b> through mitigating measures.</p> <p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p> <p>All impact assessments conclusions remain <b>not significant</b> (either pre or post mitigation).</p>	No
<b>Chapter 17: Shipping and Navigation</b>	<p>Impacts on shipping and navigation receptors, following mitigating measures, were assessed as <b>not significant</b> or of <b>minor significance</b> (following a specific shipping and navigational risk assessment and impact assessment process).</p> <p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p> <p>All impact assessments conclusions remain <b>not significant</b> or of <b>minor significance</b>.</p>	No
<b>Chapter 18: Military and Aviation</b>	<p>Impacts on RAF Leuchars' Primary Approach Radar (PAR) and Primary Surveillance Radar (PSR) were assessed to be of <b>major significance</b>. Reduced detectability of aircraft was assessed as being of <b>moderate significance</b> on RAF Leuchars' PSR.</p> <p>Refinement of the Design Envelope (specifically layout) has removed impacts on the PAR and the potential mitigation options are being discussed with the Ministry of Defence (MOD).</p>	Yes

Receptor	Overview of implications of design parameter refinement	Supplementary Information Presented
<b>Chapter 19: Maritime Archaeology and Cultural Heritage</b>	<p>Impacts were predicted of major significance, however these impacts were predicted to be mitigated through avoidance and other measures and therefore all residual impacts were assessed as of <b>minor significance</b> or lower.</p> <p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p> <p>All impact assessments conclusions remain <b>not significant</b> or of <b>minor significance</b>.</p>	No
<b>Chapter 21: Landscape, Seascape and Visual Impacts</b>	<p>Some seascape, landscape and visual impacts were assessed as being of <b>moderate</b> or <b>major significance</b>.</p> <p>No Design Envelope refinements will affect the original impact assessment conclusions. Revised visualisations have been prepared to reflect the updated indicative layout and appraisal information regarding potential cumulative effects is presented in this addendum.</p>	Yes
<b>Chapter 22: Other Users</b>	<p>All impacts on other user receptors were assessed as being <b>not significant</b> or of <b>minor significance</b>.</p> <p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p> <p>All impact assessments conclusions remain <b>not significant</b> or of <b>minor significance</b>.</p>	No
<b>Chapter 23: Socio-Economics</b>	<p>No Design Envelope refinements will affect the original impact assessment conclusions and therefore further assessment has not been carried out.</p>	No

### 3.2 Supplementary Environmental Information

#### 3.2.1 Introduction

34 Both in response to Design Envelope refinements and requests from consultees, reports have been commissioned to provide further information on specific aspects such as the lighting requirements. These reports are provided within Section D of this Addendum of Supplementary Environmental Information.

35 Further to the refinement of the Design Envelope, where appropriate, additional data and information have been collated and analysed to provide further information for specific receptors and provide information to inform consultees, namely for selected topics including ornithology, salmonid fish species and protected sites.

#### 3.2.2 Summary of Information Presented

36 Table 3 below directs the reader to the location of any supplementary environmental information in this document.

37 With the exception of ornithology, no Design Envelope change will substantively affect the original assessment conclusions.

38 Outlined below is a summary of supplementary environmental information provided in this Addendum of Supplementary Environmental Information.

Table 3: Summary of Supplementary Environmental Information presented in this Addendum

Receptor	No assessment necessary	Assessment undertaken and supplementary information presented	Supporting information presented (refer to Section D)
Chapter 8: Geology and Bathymetry	X		
Chapter 8: Water Quality	X		
Chapter 9: Physical Processes	X		
Chapter 10: Air Quality	X		
Chapter 11: Nature Conservation		Ornithology Appendix 3: HRA (SPAs); and Fish and Shellfish Appendix 1: HRA (salmonid SACs).	Marine Mammals Appendix 1: HRA (Marine mammal SACs).
Chapter 12: Ornithology (including those of conservation importance)		Ornithology Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithological Technical Report, May 2013; and Ornithology Appendix 3: HRA (SPAs).	
Chapter 13: Marine Mammals (including those of conservation importance)			Marine Mammals Appendix 1: HRA (Marine mammal SACs).
Chapter 14: Benthic Ecology	X		

Receptor	No assessment necessary	Assessment undertaken and supplementary information presented	Supporting information presented (refer to Section D)
<b>Chapter 15: Fish and Shellfish Ecology (including those of commercial and conservation importance)</b>		Fish and Shellfish Appendix 1: HRA (salmonid SACs).	Fish and Shellfish Ecology Appendix 2: High Voltage Alternative Current Electro-Magnetic Field Studies (HVAC EMF Studies).
<b>Chapter 16: Commercial Fisheries</b>	X		
<b>Chapter 17: Shipping and Navigation</b>	X		Military and Aviation Appendix 1: Proposed Scheme of Aviation and Maritime Marking and Lighting Scheme Lighting Strategy.
<b>Chapter 18: Military and Aviation</b>	X		Military and Aviation Appendix 1: Proposed Scheme of Aviation and Maritime Marking and Lighting Scheme Lighting Strategy.
<b>Chapter 19: Maritime Archaeology and Cultural Heritage</b>	X		
<b>Chapter 21: Landscape, Seascape and Visual Impacts</b>		SLVIA Appendix 2: Seascape, Landscape and Visual Impact Assessment Addendum.	SLVIA Appendix 1: Visualisations
<b>Chapter 22: Other Users</b>	X		
<b>Chapter 23: Socio-Economics</b>	X		

### 3.2.3 Ornithology

- 39 Since submission of the ES, NnGOWL has been assessing methods to mitigate collision risk impacts to birds and this has resulted in a revision to the Design Envelope to raise the minimum rotor height from 26m LAT to 30.5m LAT.
- 40 This change to the Design Envelope takes into account the engineering, technical and cost implications of raising turbine height alongside the reduction in bird collision risk numbers.
- 41 NnGOWL opted to complete a third year of ornithological survey to supplement the information provided in the ES. This survey was completed in October 2012. This additional year of survey data has confirmed the abundance and distribution of birds originally presented and improved confidence in the ornithological data.
- 42 Using the revised Design Envelope and third year ornithological survey, Bureau Waardenburg BV has produced Ornithology Appendix 2: Collision Rate Estimates of Seabirds at Neart na Gaoithe, which reports collision rate modelling using the Strategic Ornithological Support Services (SOSS) Band model.
- 43 Ornithology Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithology Technical Report, May 2013, produced by Cork Ecology, revises the Technical Report provided as Appendix 12.1 to the ES Submission. This revised document includes:

- All year three ornithological survey data;
- Revision of all three years population estimates, based on revised detection functions using 3 years of data;
- Updated assessment of Collision Risk Modelling based on three years' ornithological survey data and the revised minimum rotor height. (as per the 2013 Bureau Waardenburgh BV report, see Ornithology Appendix 2: Collision Rate Estimates of Seabirds at Neart na Gaoithe);
- Revision of cumulative impact assessment, based on more recent data from Seagreen, (Firth of Forth Round 3 Zone) and Inch Cape Offshore Limited (ICOL, Inch Cape offshore wind farm development);
- Revision of displacement assessment methodology and results following guidance from Natural England (NE)/the Joint Nature Conservation Committee (JNCC) (in the absence of any further guidance from Scottish Natural Heritage (SNH) or Marine Scotland); and
- For ease of reference, it should be noted that the barrier effects and vessel disturbance sections are unchanged from the previously submitted Ornithological Technical Report.

44 In the ES, information to inform the Habitats Regulations Appraisal (HRA) was provided within Chapter 11: Nature Conservation. For transparency, Ornithology Appendix 3: HRA (SPAs) produced by Pelagica, uses the updated information in Ornithology Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithological Technical Report, May 2013 and Appendix 2: Collision rate estimates of seabirds at Neart na Gaoithe, Collision rate modelling using the SOSS Band model to update the HRA.

45 Scottish Natural Heritage (SNH) and Royal Society for Protection of Birds (RSPB) have provided comments on the ES and these are taken into account in both Ornithology Appendix 1 and 3. NnGOWL is awaiting further advice from SNH on bird interests (as stated in SNH Memo dated 23rd November 2012) as well as guidance on best methods for taking into account declining species which NnGOWL understands SNH is preparing.

46 An update to the ES Chapter 12: Ornithology has not been produced as both SNH and RSPB raised concerns over the amount of cross referencing that was necessary to effectively review this Chapter in the original ES submission and it was considered more efficient for this Addendum to refer directly from Ornithological Appendix 1: Neart na Gaoithe Offshore Wind Farm Ornithology Technical Report to Appendix 3: HRA (SPAs). Ornithology Appendices 1, 2 and 3 supersede any conclusions drawn in the ES Chapter 12: Ornithology.

### 3.2.4 Marine Mammals

47 As with ornithological surveys, marine mammal surveys were also continued for a 3rd Year until October 2012. The visual data from these surveys for SAC species is included in Marine Mammals Appendix 1: HRA (Marine Mammal SACs). Data has also been included from the Seagreen Environmental Statement and HRA submission.

48 SNH and Whale and Dolphin Conservation Society (WDCS) have provided comments on the ES and these comments are taken into account in the Marine Mammals Appendix 1: HRA. NnGOWL is awaiting advice from SNH as to the best methods for taking declining species into account, in particular, Harbour Seals.

49 Marine Mammal Appendix 1: HRA (Marine Mammal SACs) verifies the assessment within Chapter 11: Nature Conservation of the original ES. The HRA covers Bottlenose Dolphins (Moray Firth SAC), Grey Seals (Isle of May SAC, Berwickshire and North Northumberland Coast SAC) and Harbour Seals (Firth of Tay and Eden SAC).

### 3.2.5 Fish and Shellfish Ecology

50 Following comments from SNH on the ES, specifically those related to the presentation of the HRA for salmonid or riverine SACs, a revised document detailing the HRA for salmonid SACs has been developed. This is appended to this document as Fish and Shellfish Ecology Appendix 1: HRA (Salmonid SACs) and updates Boxes 1.25, 1.26 and 1.27 within Chapter 11: Nature Conservation of the ES. Introductory information is also presented on the HRA process and background to provide context.

- 51 Fish and Shellfish Ecology Appendix 1: HRA (Salmonid SACs) also includes additional assessments for two further salmonid SACs, the River Dee SAC and the River Tweed SAC, as requested by the Association of Salmon Fisheries Boards in their comments on the ES.
- 52 Fish and Shellfish Ecology Appendix 1: HRA (Salmonid SACs) also draws on a further report commissioned to predict changes in electromagnetic field (EMF) density as a result of the development of the wind farm. This report is provided in Fish and Shellfish Ecology Appendix 2: HVAC EMF Studies.

### 3.2.6 Military and Aviation

#### 3.2.6.1 Lighting and Marking

- 53 Following the original information on military and aviation (presented in the ES as Chapter 18: Military and Aviation), further work has been carried out to develop a scheme of aviation and maritime lighting and marking, to ensure safety requirements are fully satisfied and following requests from consultees. This is provided in Military and Aviation Appendix 1: Proposed Scheme of Aviation and Maritime Marking and Lighting Scheme. The report also includes information regarding likely night time visibility from shore in response to requests from consultees.

#### 3.2.6.2 Impacts and Interference with Radar

- 54 As identified in Chapter 18 of the ES, the Neart na Gaoithe offshore site was assessed to be in radar line of sight of the PSR at RAF Leuchars and therefore mitigation is required to avoid this impact, assessed as being of major significance in the ES. The requirement for mitigation was confirmed by the Ministry of Defence (MOD) following publication of the ES. Mitigation measures are being discussed with the MOD.
- 55 Furthermore there is potential for the project to interfere with the Precision Approach Radar (PAR) at RAF Leuchars, as originally identified in Chapter 18 of the ES. This interference potential is limited to a small number of turbines to the extreme northwest of the project offshore site boundary. Notwithstanding the written clearance issued by the MOD regarding this issue at pre-application stage, NnGOWL will exclude turbines from the area affected by the PAR issue; as demonstrated in the revised indicative layout.
- 56 Following submission of the Neart na Gaoithe offshore wind farm application and supporting ES to MS-LOT the MOD also advised NnGOWL that the Air Defence Radar (ADR) at Brizlee Wood will be affected by the development. NnGOWL is working with other offshore wind farm developers to agree a solution to this, with continued consultation with the MOD.
- 57 NnGOWL has confirmed that conditions requiring delivery of these measures would be acceptable to the project.

### 3.2.7 Seascape, Landscape and Visual

- 58 As a result of the revised design envelope and indicative layout update, and following comments from SNH, further visualisations have been produced and are included in SLVIA Appendix 1: Visualisations. This includes Zone of theoretical visibility (ZTV) maps and visualisations illustrating the refined design envelope parameters. Again in response to SNH comments, the format of the visualisations has been amended.
- 59 In addition, a cumulative appraisal has been undertaken to provide an overview of the likely impacts of the three offshore wind farms proposed in the Forth and Tay area, included in SLVIA Appendix 2: Seascape, Landscape and Visual Impact Assessment Addendum. The appraisal is based on updated information relating to the offshore proposals. In response to comments from SNH, cumulative ZTV maps have been prepared for both offshore wind farms and offshore and onshore wind farms. Cumulative visualisations have been prepared to illustrate the refined Neart na Gaoithe scenario alongside the updated Inch Cape and Seagreen Phase I scenarios.

## 4 Section D: Supporting Appendices

The following appendices are included in this Addendum of Supplementary Environmental Information (refer to Table 4):

Table 4: List of appendices forming part of the Addendum of Supplementary Environmental Information

Appendix Number	Appendix Title
<b>Technical Appendix 1</b>	Refined Design Envelope
<b>Ornithology Appendix 1</b>	Neart na Gaoithe Offshore Wind Farm Ornithological Technical Report, May 2013
<b>Ornithology Appendix 2</b>	Collision Rate Estimates of Seabirds at Neart na Gaoithe
<b>Ornithology Appendix 3</b>	Habitats Regulation Appraisal (Special Protection Areas)
<b>Marine Mammals Appendix 1</b>	Habitats Regulation Appraisal (Marine Mammal Special Areas of Conservation)
<b>Fish and Shellfish Ecology Appendix 1</b>	Habitats Regulation Appraisal (Salmonid Special Areas of Conservation)
<b>Fish and Shellfish Ecology Appendix 2</b>	High Voltage Alternating Current Electro-Magnetic Field Studies
<b>Military and Aviation Appendix 1</b>	Proposed Scheme of Aviation and Maritime Marking and Lighting Scheme
<b>Seascape, Landscape and Visual Impact Assessment Appendix 1</b>	Visualisations
<b>Seascape, Landscape and Visual Impact Assessment Appendix 2</b>	Seascape, Landscape and Visual Impact Assessment Addendum