



# Gordonbush Windfarm Environmental Statement

Prepared for  
**SSE Generation Limited**  
By **Land Use Consultants**

**June 2003**

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Environmental Statement**

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# CONTENTS

<b>PREFACE</b> .....	<b>v</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
Overview of Development .....	1
The Applicant .....	1
The Environmental Statement .....	1
Project Team .....	2
<b>2. BACKGROUND TO THE DEVELOPMENT</b> .....	<b>3</b>
Introduction .....	3
Climate Change and Renewable Energy Programmes .....	3
New Renewable Energy .....	4
Site Selection .....	4
Summary .....	5
References .....	6
<b>3. ENVIRONMENTAL IMPACT ASSESSMENT</b> .....	<b>7</b>
Introduction .....	7
EIA Regulations .....	7
EIA Process Overview .....	8
Scoping .....	8
Consultation and Community Liaison .....	12
Baseline Assessment .....	14
Assessment of Effects .....	14
Mitigation and Monitoring .....	15
Design Iteration .....	15
<b>4. SITE CONTEXT</b> .....	<b>19</b>
Introduction .....	19
Location and Topography .....	19
Statutory Designations .....	19
Population and Settlements .....	19
Economic Activity .....	19
Infrastructure .....	20
References .....	20
<b>5. PLANNING CONTEXT</b> .....	<b>21</b>
Introduction .....	21
Scottish Planning Policy and Guidance .....	21
Strategic Planning Policy and Guidance .....	21
Local Planning Policy and Guidance .....	21
Overview of Planning Context .....	21

<b>6. DEVELOPMENT DESCRIPTION</b> .....	<b>27</b>
Introduction .....	27
Core Development Components .....	27
Associated Developments .....	29
Construction Details .....	29
Operation .....	31
Decommissioning .....	31
Design Process and Iteration .....	32
<b>7. LANDSCAPE AND VISUAL EFFECTS</b> .....	<b>35</b>
Introduction .....	35
Potential Significant Effects .....	35
Consultation .....	35
Policy Context .....	36
Assessment Approach .....	37
Existing Situation .....	40
Assessment of Potential Effects .....	45
Summary and Conclusion .....	66
References .....	67
<b>8. ECOLOGY</b> .....	<b>69</b>
Introduction .....	69
Potential Significant Effects .....	69
Consultation .....	69
Policy Context .....	70
Assessment Approach .....	70
Existing Situation .....	73
Assessment of Effects .....	76
Mitigation .....	78
Residual Effects .....	79
Summary of Significant Effects .....	79
<b>9. BIRDS</b> .....	<b>81</b>
Introduction .....	81
Potential Significant Effects .....	81
Consultation .....	81
Assessment Approach .....	81
Existing Situation .....	84
Assessment of Potential Effects .....	85
Mitigation .....	88
Summary and Conclusions .....	88
References .....	88

<b>10. NOISE.....</b>	<b>89</b>
Introduction.....	89
Potential Significant Effects.....	89
Consultation.....	89
Policy Context.....	89
Assessment Approach.....	90
Existing Situation.....	90
Assessment of Potential Effects.....	91
Mitigation.....	93
Summary and Conclusions.....	93
<b>11. ARCHAEOLOGY AND CULTURAL HERITAGE.....</b>	<b>95</b>
Introduction.....	95
Potential Significant Effects.....	95
Consultation.....	95
Policy Context.....	95
Assessment Approach.....	96
Existing Situation.....	97
Assessment of Potential Effects.....	99
Mitigation and Monitoring.....	100
Summary and Conclusions.....	101
References.....	102
<b>12. TRAFFIC, TRANSPORTATION AND ACCESS.....</b>	<b>103</b>
Introduction.....	103
Potential Significant Effects.....	103
Consultation.....	103
Policy Context.....	103
Assessment Approach.....	104
Existing Situation.....	104
Assessment of Potential Effects.....	105
Mitigation.....	108
Summary and Conclusions.....	108
References.....	109
<b>13. TELECOMMUNICATIONS AND AVIATION.....</b>	<b>111</b>
Introduction.....	111
Potential Significant Effects.....	111
Consultation.....	111
Policy Context.....	112
Assessment Approach.....	112
Existing Situation.....	113
Assessment of Potential Effects.....	113
Mitigation.....	114
Summary and Conclusions.....	114
References.....	114

<b>14. HYDROLOGY AND HYDROGEOLOGY.....</b>	<b>115</b>
Introduction.....	115
Potential Significant Effects.....	115
Consultation.....	116
Assessment Approach.....	117
Existing Situation.....	118
Assessment of Potential Effects.....	120
Mitigation.....	125
Summary and Conclusions.....	125
<b>15. AIR QUALITY AND CLIMATE.....</b>	<b>127</b>
Introduction.....	127
Potential Significant Effects.....	127
Consultation.....	127
Policy Context.....	127
Assessment Approach.....	127
Existing Situation.....	128
Assessment of Potential Effects.....	128
Mitigation.....	130
Summary and Conclusions.....	130
References.....	130
<b>16. RECREATION AND TOURISM.....</b>	<b>131</b>
Introduction.....	131
Potential Effects.....	131
Consultation.....	131
Policy Context.....	132
Assessment Approach.....	133
Existing Situation.....	134
Assessment of Potential Effects.....	136
Mitigation.....	138
Summary and Conclusion.....	139
<b>17. SOCIAL AND ECONOMIC EFFECTS.....</b>	<b>141</b>
Introduction.....	141
Potential Significant Effects.....	141
Consultation.....	141
Policy Context.....	141
Assessment Approach.....	142
Existing Situation.....	143
Assessment of Potential Effects.....	144
Mitigation.....	146
Summary and Conclusions.....	146
<b>18. SUMMARY AND CONCLUSIONS.....</b>	<b>149</b>
Introduction.....	149
Significant Effects prior to Mitigation.....	149
Significant Effects after Mitigation.....	149

## Tables

Table 3.1	Relationship between Proposed Topics and Environmental Aspects proposed in the Regulations	Table 10.5	Windfarm noise immission levels at each of the selected assessment locations calculated in terms of the dB(A) $L_{A90,T}$ noise levels at 4.0m height as a function of 10m height wind speed.
Table 3.2	Criteria for Evaluating Possible Significance of Effects	Table 10.6	Summary of the Effects of the Windfarm on Noise
Table 3.3	Summary of Potential Significant Effects of the Gordonbush Windfarm Proposal identified during the Scoping Process	Table 11.1	Summary of Potential Significant Effects on Archaeology
Table 3.4	Responses to the Scoping Consultation Process	Table 11.2	Summary of Consultation Responses relating to Archaeological Effects of the Development
Table 3.5	Consultation findings	Table 11.3	Criteria for Assessing Magnitude of Impacts on Archaeology
Table 5.1	Summary of Planning Policy relating to Gordonbush Windfarm	Table 11.4	Criteria for Assessing Sensitivity
Table 6.1	Typical Construction Programme	Table 11.5	Significance Criteria
Table 6.2	Summary of Estimated Construction Traffic	Table 11.6	Archaeological Sites identified during the Desk Assessment
Table 6.3	Summary of Key Stages in the Iteration and Design Process	Table 11.7	Archaeological Field Survey Findings
Table 7.1	Potential Significant Landscape and Visual Effects	Table 11.8	Summary of the Effects of the Windfarm on Archaeology
Table 7.2	Summary of Consultation Responses relating to Landscape and Visual Effects	Table 12.1	Summary of Potential Significant Effects on Traffic, Transportation and Access
Table 7.3	Visual Impact Magnitude	Table 12.2	Consultation Summary
Table 7.4	Significance of Landscape and visual effects	Table 12.3	Summary of Predicted Construction Traffic
Table 7.5	Landscape Character Types within the Study Area.	Table 12.4	Outline construction Programme and Vehicle Estimates
Table 7.6	Landscape Character Types within 10km of the Windfarm	Table 12.5	Summary of the Effects of the Windfarm on Traffic, Transportation and Access
Table 7.7	Viewpoints Selected for Assessment of Effects	Table 13.1	Summary of Potential Significant Effects on Telecommunications and Aviation
Table 7.8	Summary of Viewpoint Data	Table 13.2	Consultation Responses Relating to Telecommunications and Aviation
Table 7.9	Windfarms Considered for the Assessment of Cumulative Effects	Table 13.3	Summary of the Effects of the Windfarm on Telecommunications and Aviation
Table 7.10	Cumulative Assessment for the Selected Viewpoints	Table 14.1	Potential Significant Effects of the Windfarm on Hydrology and Hydrogeology
Table 7.11	Summary of Significant Landscape and Visual Effects	Table 14.2	Summary of Consultation Responses
Table 8.1	Potential Significant Ecological Effects	Table 14.3	Criteria for Impact Magnitude
Table 8.2	Summary of Ecology Consultation Responses.	Table 14.4	Significance Criteria for Effect Assessment
Table 8.3	The IEEM Approach to Valuing Ecological Receptors.	Table 14.5	Private Water Supplies
Table 8.4	LUC Criteria for Describing Ecological Impact Magnitude.	Table 14.6	Summary of Construction Effects on Hydrology and Hydrogeology
Table 8.5	LUC Matrix for Determining Significance of Ecological Effects in Scotland.	Table 14.7	Summary of Ongoing and Operational Effects on Hydrology and Hydrogeology
Table 8.6	Ecological Value of Main Habitat Types at Gordonbush.	Table 15.1	Summary of Potential Significant Effects Air Quality and Climate
Table 8.7	Ecological Value of Faunal Species at Gordonbush	Table 15.2:	Consultation Responses Relating to Air Quality and Climate
Table 8.8	Dimensions of Construction Features	Table 15.3	Significance Criteria for the Air Quality and Climate Assessment
Table 8.9	Significance of Habitat Effects	Table 15.4	Sensitivity to Dust
Table 8.10	Proposed Habitat Mitigation and Residual Effects	Table 15.5	Summary of the Effects of the Windfarm on Air Quality and Climate
Table 9.1	Summary of Potential Significant Effects on Birds	Table 16.1	Summary of Potential Significant Effects on Recreation and Tourism
Table 9.2	Determining Factors for Nature Conservation Importance	Table 16.2	Summary of Recreation and Tourism Consultation Responses
Table 9.3	Scales of Spatial Magnitude.	Table 16.3	Significance Criteria for Assessing Effects on Recreation and Tourism
Table 9.4	Scales of Temporal Magnitude	Table 16.4	Recreation and Tourism Resources within the Vicinity of the Site
Table 9.5	Birds Recorded at Gordonbush in 2002/2003	Table 16.5	Summary of Effects of the Windfarm on Recreation and Tourism
Table 9.6	Population trends for species occurring at Gordonbush. Details are shown for breeding species of moderately high, high or very high nature conservation importance.	Table 17.1	Summary of Potential Significant Social and Economic Effects
Table 10.1	Summary of Potential Significant Effects on Noise and Vibration	Table 17.2	Summary of Consultation Responses relating to Social and Economic Effects
Table 10.2	Summary details of the sound power output of the candidate VESTAS V80-2MW-105dB wind turbine	Table 17.3	Significance Criteria for the Social and Economic Assessment
Table 10.3	Octave band spectrum for the candidate VESTAS V80-2MW-105dB wind turbine under reference wind speed conditions ( $v_{10} = 8 \text{ ms}^{-1}$ )	Table 17.4	Employment by Sector in the Case Area
Table 10.4	Distances between the closest located properties and the nearest turbines	Table 17.5	Summary of Social and Economic Effects of the Windfarm
		Table 18.1	Summary of Effects of Gordonbush Windfarm

## Figures

Figure 1.1	Site Location
Figure 6.1	Location and Layout of Development Components
Figure 6.2	Typical Wind Turbine
Figure 6.3	Typical Turbine Foundations
Figure 6.4	Typical Floating and Cut Track Sections
Figure 6.5	Typical Substation Arrangement
Figure 6.6	Typical Lattice Mast
Figure 6.7	Typical Borrow Pit Arrangement
Figure 6.8	Typical Contractor's Compound
Figure 6.9	Typical Crane Pad
Figure 6.10	Suggested Abnormal Load Route
Figure 7.1	Zone of Visual Influence of Gordonbush Windfarm
Figure 7.2	Location of Schemes included in the Cumulative Assessment
Figure 7.3	Cumulative Zone of Visual Influence
Figure 7.4	Landscape Character Types
Figure 7.5	Landscape Designations
Figure 7.6	Location of the Viewpoints
Figure 7.7	Viewpoint 1 Cnoc Caoruinn, Ben Armine
Figure 7.7a	Viewpoint 1 Cnoc Caoruinn, Ben Armine
Figure 7.8	Viewpoint 2 Kinbrace Cemetery
Figure 7.8a	Viewpoint 2 Kinbrace Cemetery
Figure 7.9	A897 nr Kinbrace
Figure 7.10	Viewpoint 4 A897 Kildonan
Figure 7.10a	Viewpoint 4 A897 Kildonan
Figure 7.11	Viewpoint 5 Creag nam Fiadh, Borrobol Forest
Figure 7.12	Viewpoint 6 Ben Horn
Figure 7.12a	Viewpoint 6 Ben Horn
Figure 7.13	Viewpoint 7 Gordonbush Access Road
Figure 7.14	Viewpoint 8 South Loch Brora
Figure 7.14a	Viewpoint 8 South Loch Brora
Figure 7.15	Viewpoint 9 Ardachu Road
Figure 7.16	Viewpoint 10 Morven
Figure 7.16a	Viewpoint 10 Morven
Figure 7.17	Viewpoint 11 Beinn Bhragaidh
Figure 7.17a	Viewpoint 11 Beinn Bhragaidh
Figure 7.18	Viewpoint 12 Craggy Beg
Figure 7.18a	Viewpoint 12 Craggy Beg
Figure 7.19	Viewpoint 13 Beinn Dhorain
Figure 7.20	Viewpoint 14 Sciberscross
Figure 7.20a	Viewpoint 14 Sciberscross
Figure 7.21	Viewpoint 15 Beinn Smeorail
Figure 7.21a	Viewpoint 15 Beinn Smeorail
Figure 7.22	Viewpoint 16 Baile an Or (A897)
Figure 7.23	Viewpoint 17 Ben Armine Lodge Access Road
Figure 8.1	Sites Designated for Ecological Value
Figure 8.2	Phase 1 Habitat Map
Figure 8.3	Otter Survey at Gordonbush
Figure 8.4	Water Vole Survey at Gordonbush

Figure 10.1	Nearest Neighbour Locations
Figure 11.1	Known Archaeological Remains
Figure 14.1	Solid and Drift Geology Map
Figure 14.2	Soils Map
Figure 14.3	Indicative Surface Water Catchment Plan
Figure 16.1	Location of Tourism and Recreation Sites
Figure A	Layout Design Development
Figure 1	Survey Area
Figure 2	Vantage Point 1 and Visible Area
Figure 3	Vantage Point 2 and visible Area
Figure 4	Location of Breeding Bird Territories
Figure 5	Flight Activity

## Appendices

Appendix 1.1	Statement of Competence of the Assessors
Appendix 7.1	Design Statement
Appendix 8.1	Water Vole and Otter Survey Report
Appendix 9.1	Birds Technical Report
Appendix 11.1	Archaeological Field Survey Report
Appendix 12.1	Transport Statement

## PREFACE

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This document has been prepared to support an application for the development of a windfarm at Gordonbush, near Brora in Sutherland on behalf of SSE Generation Limited.

The Environmental Statement includes the following documents:

- The Environmental Statement;
- A Non Technical Summary.

Copies of these reports may be viewed at:

Highland Council Service Point  
Gower Street  
Brora

Area Planning Office  
District Council Offices  
Highland Council  
The Meadows  
Dornoch

Highland Council  
Department of Planning and Development  
Glenurquhart Road  
Inverness

Secretarial Department  
Scottish and Southern Energy plc  
Inveralmond House  
200 Dunkeld Road  
Perth

Further copies of the reports can be obtained from:

Dr. Chris Marden  
Scottish and Southern Energy plc  
Inveralmond House  
200 Dunkeld Road  
Perth  
PH1 3AQ  
Tel: 01738 456164

The Non Technical Summary is available free of charge. A copy of the full Environmental Statement will be charged at £100.

This Environmental Statement has been prepared by Land Use Consultants.

Approved by:

.....  
Marc van Grieken, Principal

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June 2003





## ***Part A:*** Introduction to the proposals and the assessment process



# I. INTRODUCTION

---

## OVERVIEW OF DEVELOPMENT

- I.1. This document is the Environmental Statement (ES) which has been prepared by Land Use Consultants to accompany a proposal by SSE Generation Limited (hereafter Scottish and Southern Energy) for a proposal to develop a 35 turbine windfarm at Gordonbush Estate.
- I.2. The site is approximately 12km north west of Brora in Sutherland, in the Highland Council area, and is located on an upland plateau /ridge, approximately mid-way between the Brora and Helmsdale rivers (**Figure I.1**).
- I.3. The proposal for a windfarm at Gordonbush is in response to the Renewables Obligation, a market based mechanism designed to promote renewable energy generation, which was introduced by the UK government in April 2002. The promotion of additional renewable energy generation forms an element of the UK's climate change programme, with the aim of decreasing carbon dioxide emissions by increasing supply of renewable energy from the current 3% (in 2002) to 10% by 2010 (see **Chapter 2**).

## LEGISLATIVE CONTEXT

- I.4. The proposal has a generating capacity of over 50 megawatts (MW), and will therefore require consent from the Scottish Ministers under section 36 of the *Electricity Act 1989* (c29), having consulted with Highland Council and other relevant agencies. It will also be subject to the *Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000*, hereafter known as 'the Regulations'. As the development will involve the construction of 35 wind turbines, the development proposals should be subject to an Environmental Impact Assessment (EIA) (as defined by Section 3(2) of the Regulations).
- I.5. A Scoping Opinion has been obtained from Scottish Ministers as to the environmental effects to be considered in the EIA.

## THE APPLICANT

- I.6. Scottish and Southern Energy plc is a FTSE-100 company, formed in 1998 from the merger of Scottish Hydro-Electric plc and Southern Electric plc. The company is based in Perth, and employs around 9,000 people. Core activities include the generation and supply, and transmission and distribution of electricity. Other activities include the operation of a telecoms network, supply of gas, retail shops and utility and specialist contracting. The company has a market capitalisation of about £5.5 billion, and supplies nearly 5 million energy customers from Shetland to the Isle of Wight under the Scottish Hydro-Electric, Southern Electric and Swalec supply brands.
- I.7. The applicant for the current proposal, SSE Generation Limited, owns and operates the power generation assets of the company. These include 1384MW of conventional and pumped storage hydro power plant and 2497MW of thermal plant (primarily high efficiency gas fired). In addition, the company has interests in six Joint Venture power projects totalling 3123MW.
- I.8. Scottish and Southern Energy has an extensive infrastructure in the north of Scotland, including 77 hydro power stations, 98 dams, and 78 reservoirs with associated tunnels,

pipelines and aqueducts; the 1520MW gas fired power station at Peterhead; and various diesel power stations on the islands. The electricity transmission and distribution network of overhead lines, and underground and submarine cables extends to 123,000km. This network is operated by the regulated Power Systems division of the company, which has recently completed a five year investment programme of £350 million to refurbish the network to improve security of supply in the north of Scotland. It is also developing proposals to upgrade the grid system to allow significant new renewable energy schemes to be developed.

- I.9. Scottish and Southern Energy is the UK's leading generator and supplier of renewable energy. Typically, 8% of its total supply is from renewable sources, some 40% of the UK total. The majority of this renewable output is from hydro plant. The company was involved in the early development of wind power in the UK, with experimental turbines at Burgher Hill on the Orkney Islands, and Sussetter Hill on the Shetland Islands. Recent new renewable projects include a 3MW hydro scheme at Cuileig, near Ullapool, and a 12MW windfarm at Tangy, in Kintyre. The Company has announced a £450 million investment programme for renewables. £250 million will refurbish the existing hydro power stations and £200 million will be invested in new renewable projects such as wind generation.
- I.10. Scottish and Southern Energy is a significant employer in the north of Scotland, with linesmen, power station, and shop staff forming the public face of the Company. There is an established community programme based on the support of charities and community initiatives, and promotion of the welfare and well-being of young people, sport, safety, energy efficiency and environmental education.

## THE ENVIRONMENTAL STATEMENT

### Overview

- I.11. This ES reports the findings of the EIA, and includes a description of the development, an assessment of the likely effects of the development on the environment, and the proposed measures to mitigate any significant environmental effects. The specific requirements of an ES are set out in more detail in **Chapter 3**.

## Structure of the Environmental Statement

1.12. The ES is structured as follows:

*Part A: Introduction to the proposals and the assessment process*

- **Chapter 1: Introduction;**
- **Chapter 2: Background to the Project:** outlines climate change and renewable energy policy, and the site selection process;
- **Chapter 3: Environmental Impact Assessment:** describes the underlying approach and methodology used to undertake the EIA and to prepare the ES;

*Part B: Site Context*

- **Chapter 4: Site Context:** describes the general physical and man-made characteristics of the site and its environs;
- **Chapter 5: Planning Context:** provides a summary of relevant planning policy;

*Part C: The Proposal*

- **Chapter 6: Development Description:** provides a detailed description of the windfarm and associated infrastructure;

*Part D: Assessment of Effects*

- **Chapters 7-17:** describe in more detail the specific topics assessed in the EIA, including:
  - **Chapter 7: Landscape and Visual Assessment;**
  - **Chapter 8: Ecology;**
  - **Chapter 9: Birds;**
  - **Chapter 10: Noise;**
  - **Chapter 11: Archaeology and Cultural Heritage;**
  - **Chapter 12: Traffic, Transportation and Access;**
  - **Chapter 13: Telecommunications and Aviation;**
  - **Chapter 14: Hydrology, Geology and Hydrogeology;**
  - **Chapter 15: Air Quality and Climate;**
  - **Chapter 16: Recreation and Tourism;**
  - **Chapter 17: Social and Economic Effects.**
- **Chapter 18: Summary and Conclusions:** draws together the main findings of the EIA.

## PROJECT TEAM

1.13. LUC has co-ordinated and managed the Environmental Impact Assessment and prepared the Environmental Statement, supported by specialist sub consultants. LUC produced the introductory chapters (Chapters 1- 6), summary chapters, and chapters on planning policy, Landscape and Visual Assessment, Ecology, Recreation and Tourism and Social and Economic Effects. LUC has worked closely with other specialists of the project design and development team, with specific responsibilities set out below:

- **ArupScotland:** Hydrology, Geology and Hydrogeology; Traffic, Transportation and Access; Air Quality and Climate; Telecommunications and Aviation;
- **Natural Research (Projects) Ltd.:** Birds;
- **Stuart Farrell, Archaeologist:** Archaeology and Cultural Heritage;
- **Hoare Lea Acoustics:** Noise.

1.14. **Appendix I.1** summarises the experience and competence of the assessment team.

# GORDONBUSH WINDFARM

Scottish and Southern Energy

Site Location

Scale 1:300,000

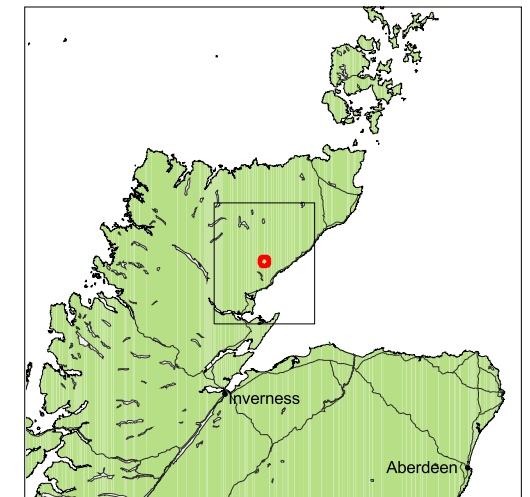
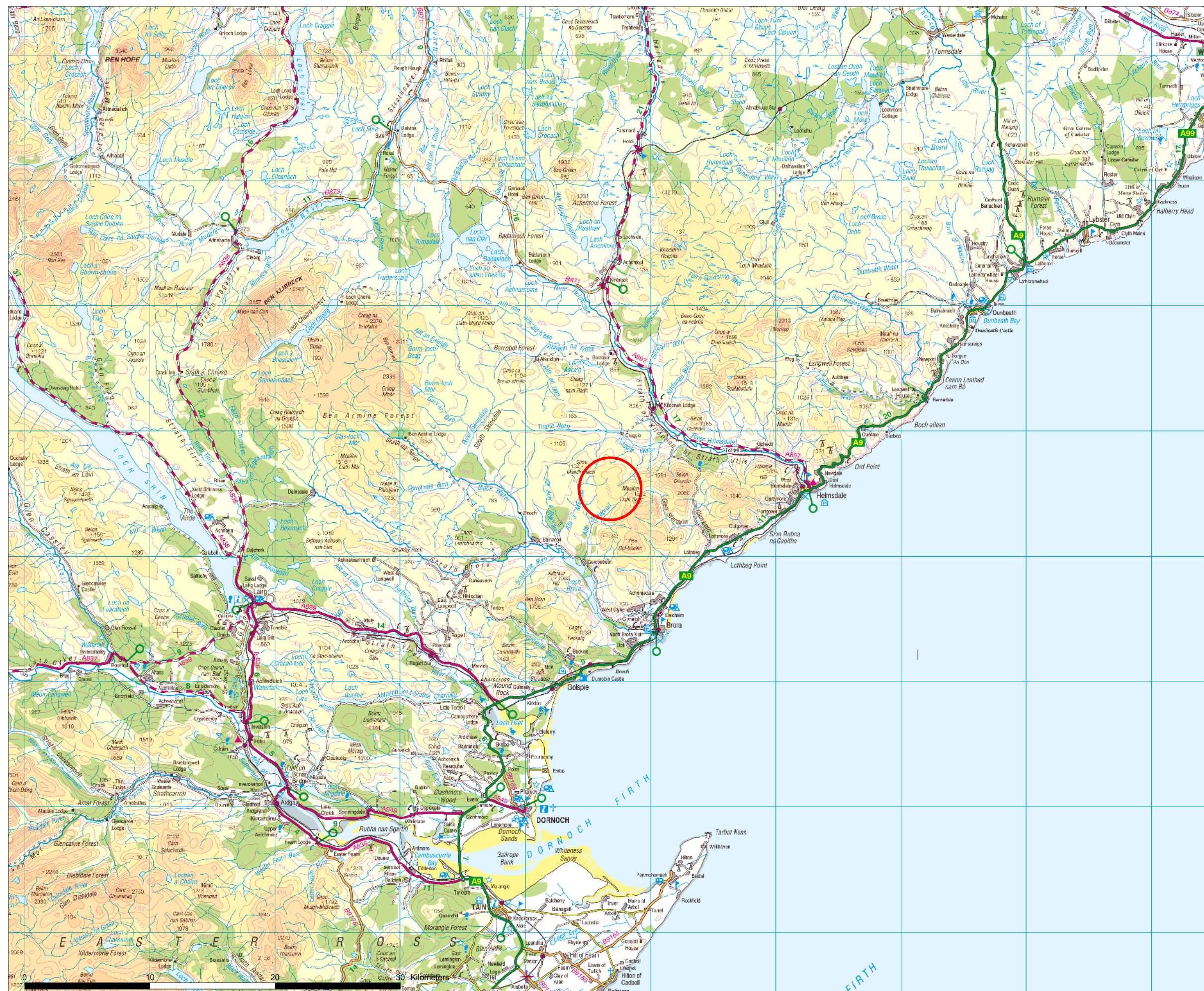


Figure 1.1

## 2. BACKGROUND TO THE DEVELOPMENT

---

### INTRODUCTION

- 2.1. This Chapter describes the context within which new renewable energy projects are being developed, and hence the rationale for the development of a windfarm at Gordonbush Estate.
- 2.2. It includes details of:
  - the Climate Change Programme, and its implications for energy generation in the UK and Scotland;
  - policy relating to new and renewable energy;
  - the role of wind energy; and
  - the site selection process undertaken by Scottish and Southern Energy which led to the identification of the Gordonbush site.

### CLIMATE CHANGE AND RENEWABLE ENERGY PROGRAMMES

#### Causes and Effects of Climate Change

- 2.3. Global climate change is widely recognised as being one of the greatest environmental challenges facing the world today. The Royal Commission on Environmental Pollution (RCEP)<sup>i</sup> reported that human-induced climate change is threatening to impose very significant shifts in temperatures, rainfall, extremes of weather and rise in sea levels in this century and those that follow. Emissions of greenhouse gases, particularly carbon dioxide from the combustion of fossil fuels, are widely believed to be accelerating climate change by reducing the loss of heat from the atmosphere, and hence causing 'global warming'.

#### International Climate Change Agenda

- 2.4. At the Kyoto Summit in 1997, many industrialised nations agreed to reduce their greenhouse gas emissions. The target for the EU is 8%, which has been divided between member states according to their projected energy requirements and capabilities.
- 2.5. In November 1997, the European Commission adopted a White Paper on Renewable Energy<sup>ii</sup>. For the first time, this paper set out a comprehensive Strategy and Action Plan to achieve an ambitious goal – doubling the share of the EU's total energy supplied from renewables from 6% to 12%, by 2010, as a means of reducing carbon dioxide emissions.
- 2.6. The Renewable Energy Action Plan, entitled *Campaign for Take Off*<sup>iii</sup> launched in 1999, aims to accelerate the development of the White Paper Strategy by stimulating increased private investment in renewables, with an emphasis on solar, wind and biomass technologies.
- 2.7. The European Union's Renewable Energy Directive<sup>iv</sup> was adopted in September 2001. It aims to establish a framework to increase the share of green electricity from 14% to 22% of gross electricity consumption by 2010. The Directive aims to promote electricity from renewable resources through:

- Quantified national targets for consumption of electricity from renewable sources of energy;
- National support schemes plus, if necessary, a harmonised support system;
- Simplification of national administrative procedures for authorisation;
- Guaranteed access to transmission and distribution of electricity from renewable energy resources.

#### The UK Climate Change Programme

- 2.8. The UK share of the EU legally binding target agreement at Kyoto is a 12.5% cut emissions of greenhouse gases by 2008-2012 against a baseline of 1990. The UK Climate Change Programme sets out the Government's approach to the challenge of climate change. It provides a national framework for moving towards a more sustainable, less carbon-intensive economy, and urges all key players to do what they can to cut greenhouse gas emissions. The programme for achieving this includes a portfolio of policy commitments and targets which the Government has put forward in an effort to combat climate change. Under this programme, the UK has a domestic goal of reducing carbon dioxide emissions by 20% (below 1990 levels) by 2008-2010.
  - 2.9. Since 1997, the UK Government has undertaken a major review of the status and prospects of renewable sources of energy, and has reinforced its support for them as contributing to a secure, diverse and sustainable energy supply. In February 2000, the Government published its initial conclusions on its new policy for new and renewable energy in the UK<sup>v</sup>.
  - 2.10. The Government's objective is that 5% of electricity requirements should be met by renewables by 2003, rising to 10% by 2010. In 2000, about 2.6% of electricity, but only 0.7% of primary energy demand in the UK was derived from renewable energy sources. Approximately half of this was generated by large scale hydropower schemes. In addition to this, the Performance and Innovation Unit (PIU) which advises government ministers and the Cabinet Office, has recommended that the existing targets for renewable energy are expanded to 20% of generation by 2020, and that this recommendation is taken into account when the current Renewables Obligation is reviewed in 2006/7<sup>vi</sup>.
  - 2.11. In February 2003 the government published a White Paper *Our Energy Future – Creating a Low Carbon Economy* with the aim of defining a long-term strategic vision for energy policy. The paper sets out a long-term framework for delivering environmental, security of supply, market competitiveness and social goals. The long-term aims are to achieve the RCEP's recommendation<sup>vii</sup> that the UK should reduce CO<sub>2</sub> emissions by some 60% from current levels by 2050.
- #### The Scottish Climate Change Programme
- 2.12. The Scottish Executive participated fully with the DETR in the consultation and development of the UK Climate Change Programme. They have also set out the programme they will implement to reduce greenhouse gas emissions in Scotland, *The Scottish Climate Change Programme*<sup>viii</sup>. This supplements the UK Climate Change Programme and includes the following measures in relation to the energy sector:

- target to increase further the use of electricity from renewable sources in Scotland by 2010, taking the total to around 18%;
  - ensure that Scotland receives an appropriate share of UK Government funding for research into new forms of renewable energy;
  - publish new planning guidelines designed to encourage the planning system to play its full part in making positive provision for renewable energy developments.
- 2.13. In March 2003 Scottish Ministers accepted a target of generating 40% of Scotland's electricity from renewable sources by 2020. This illustrates strong government commitment to renewable energy and reflects the renewable potential of Scotland.

### Renewables Obligation

- 2.14. The Government believes that its aims for renewables can best be met within the framework of a competitive market, giving the industry the greatest opportunity for technical innovation so that renewables can be made increasingly cost effective. One of the key elements of the policy is the introduction of a new Renewables Obligation, and the equivalent Renewables Obligation (Scotland) (ROS) to succeed the Non Fossil Fuel Obligation (NFFO) and Scottish Renewables Order (SRO).
- 2.15. The new Obligations, which were made effective from April 2002, oblige all licensed electricity suppliers to supply a specified proportion of their electricity supplies from eligible renewable energy sources (10% by 2010). Under the new Obligations, the licensed electricity suppliers will be required to provide evidence to the Office of Gas and Electricity Markets (OFGEM) of their compliance, in the form of Scottish Renewable Obligation Certificates (SROCs), or pay a 'buy out' penalty.

## NEW RENEWABLE ENERGY

### Renewable Energy Technologies

- 2.16. In order to meet the obligations, it will be necessary to develop new renewables on a large scale. At present the technologies which are proven and commercially available at a large scale are hydro power and onshore wind. Offshore wind and wave and tidal energy are emerging technologies, whilst solar and biomass are currently some way off commercial availability at a large scale. Hydro power is relatively well developed in Scotland, and, whilst there are still some opportunities, these appear to be relatively limited. Consequently, at the present time wind power is generally the technology of choice from the technical and commercial point of view.

### UK Wind Resources

- 2.17. The UK is the windiest country in Europe, with around 40% of the total wind resources, 25% of which is in Scotland. Onshore wind power is one of the UK's most promising renewable energy technologies, already providing electricity for 365,000 homes. Of the Government's target of 10% of electricity being supplied from renewable sources by 2010, the Government has indicated that 26% of the target, or 3,250MW, will be met from onshore wind.
- 2.18. The primary driver behind wind power is therefore a reduction in greenhouse gas emissions, as an element of the climate change programme. It is conservatively estimated that the

Gordonbush scheme will generate enough electricity to supply over 42,000 households, and would lead to annual savings of approximately 158,000 tonnes of CO<sub>2</sub>. In addition it is conservatively estimated that the windfarm will save 1800 tonnes of SO<sub>2</sub> and 520 tonnes of NO<sub>x</sub> emissions per year. These emissions can have an adverse effect on air quality.

### Scottish and Southern Energy's Renewable Energy Strategy

- 2.19. Development of windfarms forms one element of Scottish and Southern Energy's strategy to meet its Renewables Obligation. The other elements of a planned £450 million investment programme are construction of new hydro schemes, and the refurbishment of existing hydro assets.<sup>1</sup> The latter two hydro options are relatively restricted due to the limited number of environmentally and economically feasible new hydro opportunities and the fact that many of Scottish and Southern Energy's existing hydro stations are far larger than 20MW. A notable exception is the proposed 50 to 100MW Glendoe hydro scheme proposal recently announced by Scottish and Southern Energy. As a result, the company is currently taking forward plans to increase its renewables outputs by focusing on wind energy developments. The following paragraphs describe how such windfarm sites are selected in more detail.

## SITE SELECTION

### General Locational Factors

- 2.20. In general, there are a number of key high level locational factors which are taken into account in the selection of a potential windfarm site.
- 2.21. The primary technical requirements for a windfarm site are:
- adequate wind speed;
  - sufficient area;
  - appropriate ground conditions;
  - access to the electricity grid;
  - access to permit passage of abnormal loads;
  - suitable open terrain and gentle topography.
- 2.22. The main potential environmental and planning constraints for a windfarm site are:
- natural and built heritage conservation designations;
  - landscape designations;
  - close proximity to major centres of population;
  - airfield safeguarding areas.
- 2.23. Other potential constraints include:

<sup>1</sup> Existing hydro stations will be eligible for SROCs if they are refurbished and their output is less than 20MW. Refurbishment extends the life of the plant, and may increase its output. Any new build hydro schemes are eligible for ROCs.



- MoD training areas;
- extent of visibility in sensitive areas;
- cumulative effects with other developments;
- potential interference with telecommunications.

### Scottish and Southern Energy's Site Selection Process

2.24. Scottish and Southern Energy has undertaken an extensive site search, evaluation and selection exercise, to identify suitable sites for windfarm development. The exercise extended throughout Scotland, and identified in excess of 100 potential sites for detailed evaluation. The process is broadly based on the *Best Practice Guidelines for Wind Energy Development* (British Wind Energy Association<sup>ix</sup>), and takes account of the locational factors identified above. It comprises three stages as follows:

#### Stage 1: Site Search and Initial Evaluation

2.25. This exercise was essentially desk based, and uses Ordnance Survey and other map data<sup>2</sup>. Potential sites were identified and evaluated against the following initial technical, commercial and environmental criteria:

- Likely suitable wind speeds;
- Suitable topography, in terms of gradients and exposure (from review of Ordnance Survey maps);
- Spatial extent;
- Likely feasibility of economic grid connection;
- Potential impacts upon statutory designated sites including: Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar sites, National Nature Reserves (NNRs), and National Scenic Areas (NSAs);
- Local and Structure Plans and policies.

2.26. Sites which satisfied these criteria were visited to 'ground truth' the desk based information, and to identify other relevant site factors. Landowners were then identified and contacted to ascertain if there was interest in agreeing to a potential windfarm on the site. Such an agreement concluded Stage 1, along with an initial site design. Many sites were eliminated by this evaluation stage.

#### Stage 2: Feasibility

2.27. This stage considered the feasibility of the project in more detail. The following studies were undertaken:

- Review of access to identify feasibility of transporting large loads to the site;

- Identification of third parties over whose land permission for access may be required;
- A grid feasibility study;
- An assessment of ground conditions;
- A wind resource evaluation, by means of an anemometer on the site.

2.28. The major element of Stage 2 was consultation with authorities, agencies and organisations, to obtain initial advice, information and informal opinion on the likely feasibility of the project. Consultees included:

- The Scottish Executive;
- Highland Council;
- Scottish Natural Heritage (SNH);
- Royal Society for the Protection of Birds (RSPB);
- Ministry of Defence (MoD);
- Civil Aviation Authority (CAA);
- National Air Traffic Service (NATS).

2.29. Site design and layout was further informed by this process.

2.30. These studies and consultations indicated that, on available information, the site at Gordonbush (along with some further sites) should be suitable for windfarm development, subject to obtaining necessary consents. Other sites did not successfully conclude Stage 2, and have not continued to Stage 3.

#### Stage 3: Environmental Impact Assessment

2.31. Stage 3 itself comprises the undertaking of an Environmental Impact Assessment to inform the more detailed design and assist in the determination of the application for consent. Having completed the EIA, the applicant considers that this remains a suitable site for development. The following Chapter describes this process in more detail.

### SUMMARY

2.32. This chapter explained that:

- concerns about the effects of climate change have prompted international efforts to reduce man-made emissions of greenhouse gases;
- targets for reductions of greenhouse gases have been implemented at EU and UK level;
- further development of renewable energy is a central element of the climate change strategy, and is being promoted in the UK by means of the Renewable Obligation;
- onshore wind is commercially available at a large scale and, at the present time, is generally the technology of choice;

<sup>2</sup> In addition to potential sites identified from map search by Scottish and Southern Energy, other sites were proposed by landowners. These sites underwent a similar evaluation process.

- Scottish and Southern Energy has a significant renewable obligation, which it plans to meet primarily by developing onshore windfarms, along with refurbishment of existing hydro assets and development of some new hydro schemes;
- A vigorous site selection and evaluation exercise has identified a number of suitable windfarm sites, and Gordonbush is one such site.

## REFERENCES

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<sup>i</sup> Royal Commission on Environmental Pollution (2000) *Energy – The Changing Climate*, RCEP: London.

<sup>ii</sup> European Commission, (1997) *Energy for the Future: Renewable Sources of Energy, White Paper for a Community Strategy and Action Plan*, COM(97)599 Final, Office for Official Publications of the European Communities: Luxembourg.

<sup>iii</sup> European Commission (1999) *Energy for the Future: Renewable Sources of Energy Campaign for Take-Off*, White Paper for a Community Strategy and Action Plan, DG XVII, Office for Official Publications of the European Communities: Luxembourg.

<sup>iv</sup> European Commission (2001) *Directive 2001/77/EC (27 September 2001) On the Promotion of Electricity produced from Renewable Energy Sources in the Internal Electricity Market*.

<sup>v</sup> Department of Trade and Industry (DTI), (2000), *New and Renewable Energy: Prospects for the 21<sup>st</sup> Century*, HMSO: London.

<sup>vi</sup> Performance and Innovation Unit (PIU), (2002), *The Energy Review: A Performance and Innovation Unit Report*, HMSO: London.

<sup>vii</sup> Royal Commission on Environmental Pollution (2000) *Energy – The Changing Climate*, RCEP: London.

<sup>viii</sup> Scottish Executive, (2000), *Scottish Climate Change Programme*, HMSO: Edinburgh.

<sup>ix</sup> British Wind Energy Association (BWEA), (1994) *Best Practice Guidelines for Wind Energy Developments*, BWEA.

### 3. ENVIRONMENTAL IMPACT ASSESSMENT

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#### INTRODUCTION

- 3.1. This chapter outlines the statutory requirements for an EIA, and explains how the assessment of Gordonbush windfarm has been undertaken.
- 3.2. EIA is the process of compiling, evaluating and presenting all the significant environmental effects of a proposed development in order to assist the determining authority in considering and determining the application. The EIA can help to reduce the environmental effects of a project, because detection of potentially significant adverse environmental effects leads to the identification and incorporation of appropriate mitigation measures into the scheme design. Scoping forms an early part of the EIA process, whereby the main effects are identified, and preliminary ideas on mitigation are set out.
- 3.3. The EIA of the Gordonbush Windfarm proposal has been conducted in accordance with current Government regulations and good practice, comprising:
- *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000* (SSI 2000 No. 320);
  - *Circular 15/1999 Environmental Impact Assessment (Scotland) Regulations 1999*;
  - *National Planning Policy Guideline (NPPG) 6 Renewable Energy Developments* (revised 2000);
  - *Planning Advice Note (PAN) 45 Renewable Energy Technologies* (revised 2002);
  - *Planning Advice Note (PAN) 58: Environmental Impact Assessment*;
  - *Preparation of Environmental Statements for Planning Projects that require Environmental Assessment. A Good Practice Guide* (Department of the Environment, 1995).

#### EIA REGULATIONS

- 3.4. Schedule 4 (Parts I and II) of the Regulations sets out the required content of an Environmental Statement where it is deemed appropriate under Regulation 4(I). Part II of Schedule 4 identifies the key components of an ES, including:
- a description of the development, comprising information on the site, design and size of the development;
  - a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects;
  - the data required to identify and assess the main effects which the development is likely to have on the environment;
  - the main alternatives studied by the applicant and the main reasons for his choice, taking into account the environmental effects;
  - a non technical summary of the information.

- 3.5. In addition to this core information, and in accordance with Part I of Schedule 4, the following information should be provided where it is reasonably required in light of any scoping opinion (Regulation 4(1B)):
- further detail on the development itself, including associated land use requirements during construction and operation, main characteristics of the production processes, and an estimate by type and quantity of the emissions resulting from operation of the development;
  - a description of the likely significant effects of the development on the environment, including direct and indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects;
  - description of mitigation measures for any significant adverse effects on the environment; and
  - an indication of any difficulties encountered by the applicant in compiling the required information.
- 3.6. Section 2 of Schedule 4(Part I) of the Regulations identifies the aspects of the environment that should be considered in an EIA. Given that these generic topic areas are provided for all types of development subject to EIA, it would seem reasonable to propose alternative but similar headings which are more appropriate for assessing a windfarm proposal. **Table 3.1** lists the aspects recommended by the Regulations, and identifies the way in which they relate to the topics proposed for the Gordonbush windfarm EIA.

**Table 3.1 Relationship between proposed topics and environmental aspects proposed in the Regulations**

Environmental aspects included in the Gordonbush ES	Environmental aspects recommended for inclusion by the Regulations (Schedule 4, Part I)	Comments
Landscape and Visual Assessment	Landscape	Effects in visual terms are included to supplement more formally defined landscape effects.  Potential secondary effects and interactions relating to recreation and tourism.
Ecology	Flora and Fauna	Flora and Fauna dealt with together under ecology, with the exception of Birds which has been included separately to reflect potential significance in relation to windfarm developments.
Birds	Fauna	
Hydrology and Hydrogeology	Soil Water	Potential secondary effects and interactions relating to ecology and population.
Traffic, Transportation and Access	Material assets Air Population	
Air Quality and Climate	Air Climatic factors	The focus on air quality is in relation to construction and potential benefits of development and subsequent CO <sub>2</sub> reduction (closely linked with rationale for the scheme).  Potential secondary effects and interactions relating to population
Telecommunications and Aviation	Material Assets	Potential secondary effects and interactions relating to social and economic / population issues
Noise	Population	
Archaeology and Cultural Heritage	Material Assets	
Recreation and Tourism	Population	
Social and Economic Effects	Population	Social and Economic Effects incorporate health and safety issues.

## EIA PROCESS OVERVIEW

- 3.7. The EIA process was initiated by a scoping exercise with the relevant authorities, which identified the main environmental issues and potential effects which need the most thorough attention. This stage also provided an opportunity to discuss the methods of assessment. This was supplemented by a broader consultation exercise. Following this preparatory phase, the process followed the key steps identified in the DoE *Good Practice Guide*:
1. Examine the environmental character of the area likely to be affected by the development through baseline studies;
  2. Identify relevant natural and man-made processes that may already be changing the character of the site;
  3. Consider the possible interactions between the proposed development and both existing and future site conditions;
  4. Predict the possible impacts, both beneficial and adverse, of the development on the environment;
  5. Introduce design and operational modifications or other methods to avoid, minimise, avoid or mitigate adverse impacts.
- 3.8. Design iteration forms an integral part of the EIA process and involves changes in the design in order to mitigate significant effects identified through the assessment. The ES identifies such changes and reasons for them (see **Chapter 6**, paragraph 6.51, 6.52 and **Table 6.3**)

## SCOPING

### Overview

- 3.9. The Regulations provide for obtaining a Scoping Opinion from the Scottish Ministers as to the environmental effects to be considered in the EIA (Regulation 7(1)). Scottish and Southern Energy requested a Scoping Opinion for the project, and prepared a Scoping Report to assist in this process. This report set out the key elements of the ES for the proposed windfarm. The primary objective of the Scoping Report was:
- To identify all aspects of the scheme of potential environmental significance and to define issues which the EIA should address.
- 3.10. Additional objectives were:
- To establish the availability of baseline environmental data.
  - To define a survey and assessment framework from which a comprehensive overall assessment can be produced.
  - To invite statutory and non-statutory consultees to identify any concerns that they might have with the scheme and which they may wish to be addressed; to comment on the proposed methodology; and to provide and receive information on the proposed scheme.
  - To consider the way in which the findings are presented in the Environmental Statement.

**Key Issues**

3.11. Paragraph 83 of Circular 15/1999 states that the focus of an ES should be on significant environmental effects:

*‘While every ES should provide full factual description of the development, the emphasis of Schedule 4 is on the ‘main’ or ‘significant’ environmental effects to which a development is likely to give rise. In many cases, only a few of the effects will be significant and will need to be discussed in the ES in any great depth. Other impacts may be of little or no significance for the particular development in question, and will need only very brief treatment, to indicate that their possible relevance has been considered. While each ES must comply with the requirements of the Regulations, it is important that they should be prepared on a realistic basis and without any unnecessary elaboration.’*

3.12. Defining what is significant is not, however, a simple task. To assist, Annex 4 of *Environmental Impact Assessment, Guidance on Scoping* (European Commission, May 1996<sup>i</sup>) provides an indicative list of criteria for evaluating the possible significance of effects arising from a development proposal (**Table 3.2**). These criteria were used to identify the potential significant environmental effects of the windfarm.

**Table 3.2 Criteria for Evaluating Possible Significance of Effects**

<p><b>Impacts</b> Is the impact of:</p> <ul style="list-style-type: none"> <li>• Long duration</li> <li>• Irreversible</li> <li>• Large magnitude</li> </ul> <p>Will mitigation be impossible or difficult? Is a large area affected? Are a large number of people affected? Is there a high probability of occurrence?</p> <p><b>Affected Environment</b> Is the affected area valuable? Is the affected area sensitive to impact? Are the affected people sensitive to impact? Is there a high level of existing impact?</p>	<p><b>Legal and Policy Aspects</b> Are environmental standards likely to be infringed? Is there likely to be conflict with land use/spatial planning policy? Is there likely to be conflict with environmental policy?</p> <p><b>Public Awareness</b> Is there a high level of public concern? Is there a high level of political concern?</p> <p><b>Uncertainty</b> Is the magnitude or significance of impacts uncertain because of lack of knowledge? Are methods available to predict and evaluate uncertain impacts? Can appropriate methods be developed?</p>
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3.13. **Table 3.3** identifies the potential environmental effects identified through the scoping process, which formed the basis of the EIA.

**Table 3.3 Summary of Potential Significant Effects of the Gordonbush Windfarm Proposal identified in the Scoping Report**

Topic	Potential Significant Effects
Landscape and Visual Impacts	<ul style="list-style-type: none"> <li>• changes in the landscape character as a result of the construction and operation of a windfarm in an upland landscape.</li> <li>• changes in views to the area from surrounding areas during construction and operation of the windfarm.</li> </ul>
Ecology (non birds)	<ul style="list-style-type: none"> <li>• the direct loss of habitats or species through land take for access track, site compounds, borrow pits and turbine footing construction.</li> <li>• the indirect loss or damage of wetland (bog) habitats and species through secondary effect changes to local hydrological conditions as a result of construction.</li> <li>• habitat fragmentation and isolation.</li> <li>• increased levels of silt-laden run-off from construction activity compromising salmonid spawning habitats within local catchments.</li> <li>• disturbance to animal species with high individual nature conservation value (legally protected and BAP species) as a result of construction and operational maintenance activity.</li> </ul>
Birds	<ul style="list-style-type: none"> <li>• short-term reduction in breeding and wintering bird populations due to construction disturbance.</li> <li>• permanent reduction in breeding and wintering bird populations due to loss of critical elements of habitat through displacement. Impacts can extend beyond the periphery of the development depending on the species.</li> <li>• permanent reduction in breeding and wintering bird populations due to collision mortality.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• noise from construction activities, including construction traffic.</li> <li>• noise from operational turbines.</li> </ul>
Archaeology and Cultural Heritage	<ul style="list-style-type: none"> <li>• physical damage to sites or remains (partial or total removal).</li> <li>• severance of features, particularly linear features e.g. field boundaries.</li> <li>• visual intrusion on any listed buildings, archaeological or historic sites or features, affecting their setting.</li> <li>• other indirect impacts, for example those caused by disturbance from vibration, dewatering or changes in hydrology.</li> </ul>
Traffic, Transport and Access	<ul style="list-style-type: none"> <li>• changes to traffic volumes and flows during construction and operation.</li> <li>• changes in traffic composition (e.g. HGVs during construction).</li> <li>• landtake associated with junction improvements and new access track.</li> <li>• improvements to local roads.</li> </ul>
Telecommunications and Aviation	<ul style="list-style-type: none"> <li>• interference with the reception of terrestrial television and radio services at residences in the surrounding area.</li> <li>• interference with point to point transmission links operated by telecommunications service providers in the area.</li> <li>• interference with military and civilian radar/communication systems.</li> <li>• potential disruption to aircraft activity in the area.</li> </ul>

Topic	Potential Significant Effects
Hydrology, Geology and Hydrogeology	<ul style="list-style-type: none"> <li>increase in the volume of runoff due to increased impermeable areas and modifications to natural drainage patterns.</li> <li>deterioration in surface and groundwater quality due to increased sediment loads, pollution incidents during construction and alteration of drainage patterns;</li> <li>impediment to flow where tracks and trenches cross natural watercourses and flush zones.</li> <li>effects on private water supplies.</li> <li>modification of stream channel morphology (erosion / deposition).</li> <li>loss of sensitive soils or geological features.</li> <li>indirect effects on ecology.</li> </ul>
Air Quality and Climate	<ul style="list-style-type: none"> <li>effects on receptors (people, plants, animals, materials and buildings) from changes in air quality as a result of: dust arising from construction activities and emissions from construction vehicles;</li> <li>contribution to combating climate change and improving air quality through the displacement of CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> produced by the generation of electricity from fossil fuels.</li> </ul>
Recreation and Tourism	<ul style="list-style-type: none"> <li>temporary or permanent closure/diversion of permissive paths and tracks.</li> <li>creation of new access routes with potential for informal recreational use.</li> <li>noise, dust and visual impacts on recreational users, including horse-riding, walking and mountain biking (note link with the assessment of other topic areas).</li> <li>changes in the apparently wild character of the area, and the setting of surrounding areas.</li> <li>direct and indirect impacts on tourism on the site and within the wider area.</li> </ul>
Social and Economic Effects	<ul style="list-style-type: none"> <li>disturbance of existing activities within the site and surrounding area (including sporting and estate management etc).</li> <li>employment generation during manufacture, construction and operation;</li> <li>indirect economic impacts from the proposed scheme (e.g. opportunities for local supply businesses).</li> <li>risks to public safety.</li> <li>meeting the ongoing need for electricity thereby supporting/ enhancing quality of life.</li> </ul>

3.14. **Table 3.4** sets out the responses received from statutory consultees during the scoping process.

**Table 3.4 Responses to the Scoping Consultation Process**

Consultee	Key issues	ES Cross reference (chapter no.)
British Telecommunications plc	• No response to scoping consultation.	N/A
Civil Aviation Authority Directorate of Airspace Policy	• No significant aeronautical radio stations within 30km of proposed site.	13

Consultee	Key issues	ES Cross reference (chapter no.)
Crown Estate	• No response to scoping consultation.	N/A
Defence Communications Services Agency (RAF)	• No response to scoping consultation.	N/A
Defence Estates (MoD)	• No objections (valid to 5/8/04), to windfarm or monitoring masts but request further information, should development go ahead.	13
DTI	• No comments regarding the scoping report.	N/A
Health and Safety Executive	• No response to scoping consultation.	N/A
Highland Council Director of Planning and Development	<ul style="list-style-type: none"> <li>SNH recent policy guidance on LVIA to be taken into account, as well as NPPG 14 and in the Structure Plan with regard to Landscape and Visual Impacts.</li> <li>Recommends that versions of ZVI using bare ground modelling and including existing forestry should be included given that visual obstructions can change over time.</li> </ul>	7
Highland Council Economic Development	<ul style="list-style-type: none"> <li>Ensures assessment of impacts on birds addresses the impact of the development on the SPA at Coir an Eoin. Also suggests the impacts on migratory birds on eastern seaboard should be taken into account.</li> </ul>	9
Highland Council Highways Department	<ul style="list-style-type: none"> <li>Notes that there is potential for unrecorded archaeological sites to be damaged and recommends a walkover survey.</li> <li>Provides brief for archaeological walkover survey and requests that results are forwarded to the Council's Archaeology Unit.</li> </ul>	11
	<ul style="list-style-type: none"> <li>Advises a comprehensive transport assessment and full construction method statement to be included in the EIA. Scope of the assessment should be agreed with the Council.</li> </ul>	6, 12 Appendix 12.1
	<ul style="list-style-type: none"> <li>Suggests consulting Brora District Salmon Fishery Board and Sutherland Walkers' Group.</li> </ul>	8, 15
	<ul style="list-style-type: none"> <li>Advises that Structure Plan Policy G4 community benefit should be addressed.</li> <li>VisitScotland research on impact of windfarms on tourism in Scotland should be taken into account.</li> <li>VisitScotland, Caithness and Sutherland Enterprise should be included as consultees on Social and Economic Impacts</li> </ul>	16, 17
Historic Scotland	<ul style="list-style-type: none"> <li>Notes that the windfarm does not affect the site of any scheduled ancient monument directly, but that unscheduled sites may be affected.</li> <li>Refers to views to and from monuments or other cultural heritage features</li> </ul>	11
NATS (En Route) Ltd.	No safeguarding objections to the proposed development.	13



Consultee	Key issues	ES Cross reference (chapter no.)
	<ul style="list-style-type: none"> <li>Sets out the policy framework including NPPG5, PAN42, NPPG18, Policy BC1 of the Highland Structure Plan and Historic Scotland's 1998 Memorandum of Guidance on Listed Buildings and Conservation Areas.</li> </ul>	5
Scottish Executive SEPA Team	<ul style="list-style-type: none"> <li>No comment as SEPA will cover impacts</li> </ul>	N/A
Scottish Executive Waste Team	<ul style="list-style-type: none"> <li>No response to scoping consultation.</li> </ul>	N/A
Scottish Executive Environment and Rural Affairs Department: EPU: Water Team	<ul style="list-style-type: none"> <li>No comment as SEPA will take into account issues relating to the EC Water Framework Directive.</li> </ul>	N/A
Scottish Executive Planning and Building Standards:	<ul style="list-style-type: none"> <li>Assessment should refer to NPPG17 Transport and Planning, reference to guidance on Transport Assessments (para 11.9).</li> </ul>	12
Scottish Executive Development Department Road Network Management and Maintenance	<ul style="list-style-type: none"> <li>No comments to make as the impact on the trunk road network is unlikely to be significant.</li> </ul>	12
Scottish Executive Enterprise and Lifelong Learning Consents and Emergency Planning	<ul style="list-style-type: none"> <li>Provides guidance on the development description, description of the impacts, analysis of environmental impact including methodology.</li> <li>Mostly reflects the issues raised by the specialist consultants although makes further reference to the importance of assessing effects on fish.</li> <li>Refers to descriptions of mitigation methods for offsetting adverse environmental effects.</li> </ul>	8, 14

## CONSULTATION AND COMMUNITY LIAISON

### Consultation

- 3.15. In addition to consultation with the statutory 'consultation bodies' by means of the scoping exercise, a wider consultation process was also carried out during the preparation of the Environmental Statement. As part of this process, Scottish and Southern Energy contacted community councils and neighbouring estates directly. These consultees and their main comments are outlined in **Table 3.4**. The aim of this process was to inform interested parties about the development and obtain their comments on the proposals and the scope of the EIA.

**Table 3.5 Consultation findings**

Consultee	Key items of response	Cross reference ES chapter/s
Association of Salmon Fisheries Boards	<p>Impact of construction on water courses requires consultation with the local district salmon fisheries board and the local fisheries trust. Impacts could include:</p> <ul style="list-style-type: none"> <li>obstruction to upstream and downstream migration</li> <li>disturbance of spawning beds</li> <li>increases in silt and sediment loads</li> <li>point source pollution incidents</li> <li>drainage issues.</li> </ul> <p>Advises continuing and early consultation. Concerns about effects on migratory fish species and possible impacts of high voltage underwater cables and electromagnetic impacts on fish behaviour.</p>	8, 14
Association for the Protection of Rural Scotland	No response received.	N/A
Borrobol Estate	Concerns about visual effects. Concerns about effects on deer stalking and importance on the landscape and its wilderness feel for visitors. Notes that reduction in sporting customers could reduce spending in the wider local economy.	7,16,17
BEAR Scotland	General concept of the development appears to be acceptable. The connection to the site from the A9 is agreeable to the Scottish Executive.	12
British Broadcasting Commission (Spectrum Planning Group)	The windfarm development should not have a detrimental effect upon national or local BBC radio reception. Where problems arise, developers will be expected to rectify them, possibly secured through the use of Section 75 Agreements.	13
Brora Community Council	Community Benefit should be provided. Tourism issues should take into account recent research in Argyll, and link with landscape and visual effects, views from key areas.	16, 17
Brora District Salmon Fishery Board	Identifies area of the River Brora used for fishing and levels of use.	8, 14, 16
Brora Golf Club	No response received.	N/A
Brora Tourist Information Centre	No response received.	N/A
Bunillidh Sports Club	A windfarm on the Gordonbush Estate will have no effect on the activities of the club.	16
Cable and Wireless	The site of the proposed windfarm has no effect at present on Cable and Wireless' Microwave Radio Links. No objections to the development proceeding.	13
Caithness and Sutherland Chamber of Commerce	No response received.	N/A



Consultee	Key items of response	Cross reference ES chapter/s
Caithness and Sutherland Enterprise	Raised the importance of community benefits, including direct support and provision of employment opportunities in the area.	16, 17
Clyne Heritage Society	Identified the need to take into account impacts on several additional resources. Highlight the importance of taking into account effects arising from the access track and route from the A9 to the site.	11
Crown Castle UK Ltd.	Gordonbush is in an area for which National Transcommunications Ltd. has responsibility (they have forwarded a copy of letter to them). Also forwarded copy of letter to BBC Research Department and ITC.	13
Dalchalm Caravan Site	Members use the area for walking, cycling and riding. No anticipated effects on enjoyment of these activities resulting from the windfarm.	16
Deer Commission of Scotland	Identified role of deer in social and economic chapter. Noted that the DCS require a deer management plan to accompany each EIA in an area where deer welfare and management could be adversely affected. Stated that the structures are unlikely to have an adverse affect on deer activities when completed, although the timing of building operations could influence deer stalking and estate activities.	8, 16
Dornoch Airfield Authority (covered under Highland Council Roads and Transport Department)	No response received	N/A
Dunrobin Castle	No response received.	N/A
Fisheries Research Services	Falls at Ascoile and Gordonbush prevent access by salmon and sea trout, but lower reaches are spawning streams for salmon. Upper reaches of streams are likely to have brown trout populations. Risk to salmonid fish arising from siltation is a concern, and construction should be planned to avoid this.	8, 14, 16
Forest Enterprise	No response received.	N/A
Golspie Angling Club	No response received.	N/A
Golspie Community Council	No major issues raised, although some concerns relating to traffic and use of the roads.	12
Golspie Golf Club	No response received.	N/A
Helmsdale Community Council	No response received.	N/A
Helmsdale Golf Club	No response received.	N/A
Helmsdale Tourist Information Officer	No response received.	N/A
Highland Access Project	Suggested contact with SNH to obtain the Footpath Trust Study for Brora.	16
Highlands and Islands Airports Ltd	Notes that the development will have no effect on operations at Inverness or Wick Airports	13

Consultee	Key items of response	Cross reference ES chapter/s
Highlands and Islands Enterprise	Noted the importance of taking into account the cumulative effects of windfarms in the area in both negative (i.e. detracting from tourism) and positive (i.e. supporting local manufacture) terms. Raised the importance of maximising benefits for local communities through employment and training. Community Funds also highlighted as a key issue.	17
Highland Council Ranger Service	No response received.	N/A
Highlands of Scotland Tourist Board	No response received.	N/A
Highland Pursuits	No response received.	N/A
Inverness Airport Authority	(see Highlands and Islands Airports Ltd)	13
ITC	Unable to offer an analysis of potential problems until formal planning application stage. Confirm Gordonbush site is under ITC responsibility. Indicative comments suggest no significant difficulties for the site due to sparse population. Notes potential mitigation measures.	13
Kildonan Estate	Do not at present object to proposals provided that Strath of Kildonan can not see them and estate can see turbines from a minimal amount of very few positions.	7, 17
Kintradwell Estate	Raised landscape and sporting tourism issues. Concerned about visitor perceptions of the development and consequent reduction in trade and pressure on estate income and employment. Specific concerns about the American market. Note any turbines located on the boundaries between Kintradwell, Kildonan and Gordonbush would be most intrusive.	7,17
Local Fisheries Trust	Construction impacts relating to salmonid fish.	8, 14
Maritime and Coastguard Agency	No objections to the development.	13
Mercury Communications Ltd.	No response received.	N/A
North of Scotland Archaeological Society	No response received.	N/A
ntl	Without ITC approval unable to comment on domestic television reception on their behalf. Predicted that no ntl RBL or SHF links should be affected by the proposed windfarm	13
O2	Confident that the proposal does not affect current or future operations.	13
Orange	Confirmed that there are no Orange installations in the vicinity and no impact on the existing Orange network.	13
Pony Club District Commissioner	No response received.	N/A

Consultee	Key items of response	Cross reference ES chapter/s
Radio Communications Agency	No knowledge of any links that may be affected by the proposal.	13
Ramblers Association (Scotland)	No response received.	N/A
Rogart Community Council	No comments to make regarding the Environmental Assessment.	N/A
Rogart Heritage Society	No response received.	N/A
RSPB	Provided historical data of bird activity on site	9
Scottish Association for Country Sports	No response received.	N/A
Scottish Executive Communication and Information Services	No concerns with respect to radio coverage for the emergency services.	13
SNH (area officer)	Provided detailed information on path audit and network study undertaken in Caithness and Sutherland by the Footpath Trust.	16
Scottish Rights of Way and Access Society	No ROW affecting site although unrecorded routes may exist.	16
Scottish Raptor Study Group	No comment on the proposal.	N/A
Scottish Water	No response received.	N/A
Scottish Wildlife Trust	SWT has no records on the area in question. Enclosed a copy of SWT policy on wind energy.	8
Seaside Camping Site, Doll	No response received.	N/A
Suisgill Estate	Suggested viewpoints for Landscape and Visual assessment.	7
Sutherland Estate	Identified area used for fishing, stalking and field sports, seasons in use and levels of use.	16
Sutherland Partnership	The Sutherland Partnership Tourism Forum agreed to express concern over the cumulative impact of windfarms on the landscape character of Sutherland, which could negatively affect the tourism industry which is the mainstay of the area. Group is not in favour of, or in opposition to any particular windfarm development.	7, 16
Sutherland Walkers Group	Club is neutral in relation to the development. Access tracks may provide access but could impair visual amenity. There is currently little use of the area, apart from sporting activities.	7, 16
T-Mobile UK	No response received.	N/A
VisitScotland	No response received.	N/A
Vodafone	Confirmed that they have no services in the area	13

## Community Liaison

- 3.16. Scottish and Southern Energy consulted directly with the Brora, Golspie, Helmsdale and Rogart Community Councils, as representatives of the wider community, as part of the consultation exercise. In addition, the Company offered to make presentations to the community councils, to inform local communities about the proposals, to answer questions, and to listen to comments. One such presentation was made at Brora in November 2002, and was attended by an estimated 71 people. The other community councils politely declined the offer.

## BASELINE ASSESSMENT

### Aims

- 3.17. Studies were undertaken to assess the existing environmental characteristics of the area. This allowed the identification of potentially sensitive receptors and any natural and man-made processes which may already be affecting the site. It also provides a 'baseline' against which any changes as a result of the development can be quantified and evaluated.

### Methodology

- 3.18. The baseline assessment was undertaken initially through the desk based assessment of existing information sources. Where appropriate information did not exist, the need for data collection was identified.
- 3.19. The desk based survey also identified any existing statutory or other local designations which may apply to the site. The desk based survey and consultation results helped to identify the exact requirements of field survey.
- 3.20. Specific field survey methods and scope were agreed with the appropriate bodies, and the surveys undertaken at the appropriate time of year. The specific survey methodologies are described in the relevant chapters in Part D. In some cases it was necessary to supplement the baseline work with additional specialist surveys, in light of the findings of the initial survey.
- 3.21. As appropriate, the sensitivity of elements of the existing environment was evaluated to complete the baseline assessment.

## ASSESSMENT OF EFFECTS

- 3.22. This is a two stage process. Firstly, the changes to the existing situation, or **impacts**, which may result from the development are predicted and quantified, according to appropriate methodologies. Such changes may be direct, indirect, secondary, or cumulative; positive or negative; temporary, short-term, long term or permanent. Then the changes are evaluated in terms of their consequences for, or **effects** on, affected receptors.
- 3.23. In order to evaluate environmental effects and determine their significance, it is important that assessment criteria are identified. The criteria used and methodologies adopted to assess effects are described, where appropriate, within individual chapters of this ES. In assessing the effects, account is taken of relevant design features and management practices which will mitigate any effects, to ensure that the assessment is practical.
- 3.24. In general, effects are assessed by a combination of sensitivity of the environment and the degree of alteration or magnitude of impact which is predicted due to the development. The

significance of these effects has been evaluated in relation to their magnitude, geographical extent, duration, frequency, irreversibility and any regulatory standards that might apply. It does not necessarily follow, for example, that a high magnitude change will always be significant; conversely a low magnitude change will not necessarily always be insignificant. Where an assessment of significance cannot be determined (due to lack of information, unpredictable nature of an effect or uncertainty over magnitude of change) this is highlighted and discussed within the text.

- 3.25. The potential effects of the windfarm proposals are considered in terms of the impacts on each of the discrete environmental topic areas. In reality, of course, topic areas such as hydrology and ecology cannot be considered in isolation, since changes affecting one aspect will normally have secondary implications for other areas. Thus if one impact of the development proposals is likely to alter the quality and quantity of surface water flows, flora and fauna may be affected as a secondary impact. Under some circumstances, it is possible for the secondary or indirect impacts to be more significant than the changes that triggered them. It is therefore important that the EIA directly addresses the key interrelationships between the various topic areas.
- 3.26. Where appropriate the EIA also considered the effects of the development in terms of cumulative effects. Cumulative effects may be defined as those *'that result from incremental changes caused by other past, present or reasonably foreseeable future actions together with the project.'*<sup>ii</sup> These may include:
- the combined effect of individual impacts from the development (e.g. noise, dust, etc) on receptors;
  - incremental effects caused by the impacts of separate developments within the area (e.g. existing or proposed windfarm developments).
- 3.27. The scope of potential cumulative effects has been assessed through discussions with the Highland Council and SNH, and by reviewing both existing and planned windfarm developments in the local area and surrounding region (see **Chapter 7**).
- 3.28. The EIA process is designed to enable good decision-making based upon the best possible information about the environmental implications of a proposed development. There will, however, always be some uncertainty as to the exact nature and scale of the environmental effects. These may arise through shortcomings in information or due to the limitations of the prediction process. It is important that such uncertainty should be explicitly recognised and acknowledged in the ES together with comments on the ways in which this will be taken into account in the development proposals.
- 3.29. Residual effects are those which remain after mitigation measures have been introduced. The magnitude of these impacts, the sensitivity of the receptors and significance of the consequent effects is set out in each chapter.

## MITIGATION AND MONITORING

### Mitigation

- 3.30. Part 1(4) of Schedule 4 of the Regulations notes that the Environmental Statement should include *'a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.'*

- 3.31. Where effects remain which cannot be prevented or reduced with the development in its proposed form, action can be taken to mitigate these effects by design changes, or to introduce enhancement elsewhere. Where mitigation measures are required, they are clearly described in each chapter.

### Monitoring

- 3.32. The EIA sets out details, where appropriate, of post consent monitoring proposals. This includes monitoring proposals to measure the effectiveness of mitigation measures and to identify any residual effects that may occur during the construction and operational phases of the development.

## DESIGN ITERATION

- 3.33. Design iteration is integral to the EIA process as it allows adjustments to the design throughout the EIA process in order to reduce effects of the development. **Table 6.3** in **Chapter 6** illustrates the main iteration measures that have been undertaken.

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## REFERENCES

<sup>i</sup> European Commission (1996) *Environmental Impact Assessment, Guidance on Scoping*, EC: Luxemburg.

<sup>ii</sup> European Commission Directorate General XI (Environment, Nuclear Safety and Civil Protection) (1999) *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*, EC Luxemburg.

## ***Part B:*** Site Context