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Glossary and Abbreviations

AIL	Abnormal Indivisible Loads
Ancillary works	Works that facilitate the main development, such as access tracks, temporary construction compounds, etc.
AOD	Above Ordnance Datum
ADCL – GRAN	Ardclach Pluton Granite bedrock
AGLV	Area of Great Landscape Value (local policy level protection, Moray Council)
ASFB	Association of Salmon Fishery Board
ATC	Automatic Traffic Counter
AWBs	Artificial Water Bodies
BGS	British Geological Survey
CAR	Controlled Activities Regulations
CBD	Convention on Biological Diversity
Clearance cairn	An irregularly constructed, generally unstructured, mound of stones; often, but not necessarily, circular. Normally a by-product of field clearance for agricultural purposes.
Cist burial	Generally rectangular structure normally used for burial purposes; formed from stone slabs set on edge and covered by one or more horizontal slabs or capstones. Cists may be built on the surface or sunk into the ground.
CLVIA	Cumulative Landscape and Visual Impact Assessment
CMS	Construction Method Statement
CNPA	Cairngorms National Park Authority
Construction traffic	Vehicles associated with site preparation and supply of plant and equipment (excluding AILs), construction materials and labour during construction phase (expected to be less than 44 tonnes Gross Vehicle Weight, and operated under normal Construction and Use Regulations)
Designated landscapes	Landscapes designated and protected by policy, either of local authorities or the Scottish Government. Includes NSAs, SLAs, AGLVs.
DMRB	Design Manual for Roads and Bridges
dSPP	Draft Scottish Planning Policy
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIA Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000
FCS	Forestry Commission Scotland
FDSFB	Findhorn District Salmon Fishery Board
FNLFT	Findhorn, Nairn and Lossie Fishery Trust
GBRs	General Binding Rules
GRDA-META	Grampian Group and Dava Succession bedrock
GRDA-PEGN	Grampian Group and Dava Succession with pelite bedrock
GWDTE	Ground Water Dependent Terrestrial Ecosystem
HGV	Heavy Goods Vehicle (over 7.5 tonne Gross Vehicle Weight but under 44 tonne Gross Vehicle Weight and excluding AIL vehicles);
HLBAP	Highlands Local Biodiversity Action Plan
HRES	Highland Renewable Energy Strategy and Planning guidelines
Hut circle	A low, circular or oval bank of turf, earth or stone, which represents the remains of a roundhouse of later prehistoric date.
Hut platform	A levelled area cut into a slope, on which a house was built. Often the only visible evidence of the presence of a house.
HwLDP	Highland Wide Local Development Plan
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
Impact	The result of the introduction of the Proposed Wind Farm Development on an environmental resource
JNCC	Joint Nature Conservation Committee
Landscape resource	The physical and perceived landscape, as described in landscape character types, or designated landscapes
Landscape character type	Landscapes which share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns
LDP	Local Development Plan
LGV	Light Goods Vehicles (under 7.5 tonne Gross Vehicle Weight)
LNR	Local Nature Reserve
LTS	Local Transport Strategy
LVIA	Landscape and Visual Impact Assessment
Lynchets	A scarp or bank defining the upper and lower boundaries of a field; as a result of the gradual downhill movement of soil loosened by ploughing. Provides evidence of a former field system.
NBN	National Biodiversity Network

NNR	National Nature Reserve
NPF2	National Planning Framework 2
NPF3	National Planning Framework 3 Main Issues Report
NRTF	National Road Traffic Forecast
NSA	National Scenic Area (national policy level protection)
NVC	National Vegetation Classification
PAN	Planning Advice Note
PPGs	Pollution Prevention Guidance Notes
Pre-improvement	Related to agricultural practices, pre-1700 prior to the onset of agricultural improvement in the later 18th century.
PWS	Private Water Supplies
PWSRA	Private Water Supply Risk Assessment
Q95	Flow exceeded for 95% of the time
Q95 (%MF)	Q95 presented as a percentage of the annual mean flow
RBMP	River Basin Management Plans
RES	Renewable Energy Systems Ltd
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SG	Supplementary Guidance
Shepherd's cairn	A cairn of no great antiquity, erected to mark a particular spot in the landscape, often used as a marker or directional aid in upland areas.
Shieling hut	A small dwelling of stone or turf, occupied on a seasonal basis by people tending animals on upland pastures.
SINS	Site of Interest to Natural Science
SLA	Special Landscape Area (local policy level protection, THC)
SNH	Scottish Natural Heritage
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPP	Scottish Planning Policy
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Urban Drainage Systems
THC	The Highland Council
Trig point	Triangulation Pillar
UKBAP	United Kingdom Biodiversity Action Plan
VER	Valued Ecological Receptor
Visual resource	Views and visual amenity, as seen by people
WEWS	Water Environment and Water Services (Scotland) Act 2003
WHS	Wallingford HydroSolutions Ltd
WFD	Water Framework Directive

Preface

Environmental Statement and Other Planning Documents

This Environmental Statement (ES) has been prepared on behalf of RES UK & Ireland Limited (RES) in accordance with the Electricity (Applications for Consent) Regulations 1990, and Regulation 9 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) in support of an application to the Scottish Ministers Energy Consents and Deployment Unit (ECDU) for full planning permission to construct a wind farm comprising 20 wind turbines at Cairn Duhie, under Section 36 of the Electricity Act 1989.

The Environmental Statement comprises four volumes:

- Volume I: Non-Technical Summary (NTS);
- Volume II: Main Report;
- Volume III: Landscape and Visual Figures;
- Volume IV: Technical Appendices.

Additional documentation that will be submitted with this application includes:

- Design and Access Statement;
- Planning Statement;
- Consultation Report; and
- Cover Letter, confirming deposit locations for ES.

Notification

The statutory notices for this Section 36 application, including the Environmental Statement, will be published in accordance with Regulation 9 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended). The application will be advertised in the following publications:

- the Edinburgh Gazette, in two successive weeks;
- one or more national newspapers, once (in this case the Daily Record); and
- one or more local newspapers for two weeks (in this case the Nairnshire Telegraph, the Strathspey and Badenoch Herald and the Forres Gazette).

The dates of publication are yet to be determined.

Upon the first occasion of additional information being made available to the Scottish Ministers (e.g. statutory consultee responses) the Applicant will publish a notice in two successive weeks of:

- the Edinburgh Gazette; and
- the above named local newspapers.

The application, including the Environmental Statement and associated documents, will be available for viewing at the following locations:

Location Name	Normal Opening Hours	Address
The Highland Council	9:00 to 17:00, Monday to Friday	Council Offices, Glenurquhart Road, IV3 5NX
The Highland Council Nairn Service Point	9:30 to 16:00, Monday to Friday	The Court House, High Street, Nairn, IV12 4AU
The Highland Council Grantown Service Point	9:00 to 12:00, Monday to Friday	The Town House, The Square, Grantown-on-Spey, PH26 3HF
The Moray Council	8:45 to 17:00, Monday to Friday	High Street, Elgin, IV30 1BX

An electronic version of the planning submission documents, including the Environmental Statement, will be available to download from www.cairnduhie.co.uk. A Non-Technical Summary of the Environmental Statement is available free of charge from the address below on request. Copies of the Environmental Statement are available at a cost of £250 per copy in hard format (Including postage and packaging) or on CD-ROM (Price £25 per copy) and can be obtained from:

RES UK & Ireland Ltd

3rd Floor

STV

Pacific Quay

Glasgow

G51 1PQ

Fair Processing Notice

The Scottish Government Energy Consents and Deployment Unit process applications under The Electricity Act 1989. During the consultation process letters of representation can be sent to Scottish Ministers in support of or objecting to these applications.

Should Scottish Ministers call a Public Local Inquiry (PLI), copies of these representations will be sent to the Directorate of Planning and Environmental Appeals for the Reporter to consider during the inquiry. These representations will be posted on their website with personal email address, signature and home telephone number redacted (blacked out).

Copies of representations will also be issued to the developer on request, again with email address, signature and home telephone number redacted.

You can choose to mark your representation as confidential, in which case it will only be considered by Scottish Ministers and will not be shared with the Planning Authority, the developer, the Reporter (should a PLI be called) or any other third party.

If you have any queries or concerns about how your personal data will be handled, please email the Energy Consents and Deployment Unit at: energyconsents@scotland.gsi.gov.uk or in writing to Energy Consents and Deployment, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU.

1 Introduction

Introduction

1.1 This Environmental Statement (ES) is submitted in support of an application for Section 36 Consent under the Electricity Act 1989 made by RES UK & Ireland (RES) ("the Applicant") for permission to install 20 up to 3 MW wind turbines, with a total installed capacity of up to 60 MW, with associated access track infrastructure and ancillary development including external electricity transformers, underground cabling, a newly created site entrance, turning heads, crane hardstandings, a control building and substation compound, a permanent free standing meteorological monitoring (anemometer) mast, a permanent communications mast, temporary meteorological monitoring masts, a temporary construction compound with car parking, a temporary storage area, welfare facilities and two off-site areas of widening on and adjacent to the public road (as described in Chapter 4) at Cairn Duhie in the Scottish Highlands, referred to throughout this ES as "the Proposed Wind Farm Development". Deemed planning permission is also sought under section 57(2) of the Town and Country Planning (Scotland) Act 1997.

1.2 This chapter outlines and describes the environmental sensitivity of the site, the site location, the matters that consent is sought for, the Applicant, the Project Team and the structure of this ES.

Site Location

1.3 The Proposed Wind Farm Development is located to the south east of the small settlement of Ferness (located approximately 1.5 km to nearest turbine), within The Highland Council (THC) area, and is approximately 15 km south east of Nairn and 13.5 km north/north-west of Grantown-on-Spey. The location of the Proposed Wind Farm Development is shown in Figure 1.1: Site Location, Ordnance Survey Landranger 1:50,000 Sheet 27 and Explorer 1:25,000 Map 422. The site boundary of the Proposed Wind Farm Development contains an area of approximately 666 hectares, or 1647 acres, and is hereafter referred to as the 'Site', as shown in Figure 1.2: Site Boundary. The centre point of the Site is Ordnance Survey grid reference E 297769, N 842856.

1.4 The Site is dominated by a mixture of degraded bog and heath habitats with localised wooded areas and scattered mature trees. The Site is managed at a fairly low level for grazing, localised peat-cutting and burning. Evidence of more substantial management is present in the form of systematic drainage channels.

1.5 The Site includes Cairn Duhie, a low conical hill with land sloping down from it in all directions, which is the highest point on the Site at 312 m Above Ordnance Datum (AOD). The lowest point of the Site is 200 m AOD at the northern edge of the Site.

1.6 275 kV overhead transmission lines mounted on steel pylons traverse the northern part of the Site east to west.

1.7 The Site is bordered to the west by the A939 and to the north by existing forestry plantations. To the south, the Site boundary stops approximately 250 m north of the Local Authority boundary between THC and Moray Council, and to the east, the Site boundary stops approximately 20 m west of the Local Authority Boundary. The Site lies fully within THC area.

1.8 Outwith the Site, two areas of road widening are required to facilitate delivery of abnormal loads (wind turbine components) to the Site. The boundaries for these areas are shown in Figure 1.3: Road Widening Boundary.

Environmental Sensitivity

1.9 There are no international or national landscape designations within the Site.

1.10 There are a number of landscape designations within the wider area. The closest of these to the Site are the local designations of the Drynachan, Lochindorb and Dava Moor Scenic Landscape Area (SLA) located approximately 2 km to the south of the Site and the River Findhorn Area of Great Landscape Value (AGLV) located approximately 3.5 km to the north of the Site. Further details are provided within **Chapter 7: Landscape and Visual.**

1.11 There are no international or national nature conservation designations within the Site. There are two international/national nature conservations designations within 5 km of the Site: Moidach More SSSI/SAC, designated for its blanket bog habitat, is located approximately 3 km to the east of the Site; Lower Findhorn Woods SSSI/SAC, designated for its mixed woodland, bryophytes and Oligotrophic running water, is located approximately 3 km to the north of the Site. Ecological assessments including habitat surveys, a peat and blanket mire assessment, a bat habitat assessment and activity survey, a fisheries survey, a water vole survey, a badger survey and an otter survey have been undertaken on and around the Site and are described in detail in **Chapter 8: Ecology.**

1.12 The Site supports both summer breeding and over-wintering populations of birds. Ornithological surveys have been undertaken during these periods in 2011 and 2012, and are reported in **Chapter 9: Ornithology.**

1.13 There are no Scheduled Monuments or Listed Buildings present within the Site, and no part of the Site lies within a Conservation Area, Inventory Historic Battlefield or Inventory Garden and Designed landscape. Some sites of archaeological interest were identified on site and in the wider area, generally up to 10 km outwith the Site, there are a number of cultural heritage designations. These are considered in detail in **Chapter 10: Cultural Heritage and Archaeology.**

1.14 There are several minor water courses on site of less than 1 m in width and less than 0.5 m in depth. The southern part of the Site is drained by the Burn of Lochantùtach, which runs east and north to the Dorback Burn that lies to the east of the Site. The northern part of the Site is drained by the Stripe of Muckle Lyne and the Stripe of Little Lyne, which both drain

northwards into the River Findhorn. To the south of the Site, outwith the Site boundary lies the oligotrophic Lochan Tùtach. No private water supplies (PWS) are present within the Site. A number of PWS have been identified in the wider area. A PWS assessment and a Ground Water Dependent Terrestrial Ecosystem (GWDTE) assessment are described in **Chapter 11: Geology, Hydrology and Hydrogeology**. A peat slide risk assessment, peat management plan and carbon assessment have additionally been carried out and these are presented in **Chapter 5: Construction and Decommissioning and Chapter 4: Description of Development.**

1.15 There are no residential properties within the Site. Outwith the Site there are approximately 46 residential properties within 2 km of the Site Boundary. More information on residential properties in relation to potential visual, noise, shadow flicker and telecommunication impacts are presented in **Chapter 7: Landscape and Visual; Chapter 12: Noise** and **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**, respectively.

1.16 There are no core paths or public rights of way within the Site. Outwith the Site there are a number of core paths and rights of way, including the Dava Way Heritage Path located approximately 3 km to the east of the Site. Further details of potential impacts upon these receptors are described in **Chapter 7: Landscape and Visual** and **Chapter 15: Socio-economics.**

Application for Consent

1.17 RES UK & Ireland Ltd, a subsidiary of Renewable Energy Systems Holdings Ltd, is applying to the Scottish Ministers' Energy Consents and Deployment Unit (ECDU) under Section 36 of the Electricity Act 1989, for consent to construct and operate a wind farm comprising 20 wind turbines at Cairn Duhie. The site boundary and the associated road widening works that are outwith the Site are shown in Figures 1.2 and 1.3 respectively and are wholly within THC area.

1.18 Each turbine would have a tapered tubular tower and be three bladed with an overall height to blade tip not exceeding 110 m. This turbine size has been selected following a thorough site selection and design evolution process that is outlined in detail in **Chapter 3: Design Evolution and Alternatives**. Every year, the Proposed Wind Farm Development is likely to generate the electrical energy equivalent to the average annual demand of approximately 32,000 households, which equates to approximately 31% of the households in THC area, based on a 60 MW capacity. Please refer to Technical Appendix 1.1 for details.

1.19 In addition to the turbines and their foundations, the Proposed Wind Farm Development includes the following development components: Site access tracks, external electricity transformers, crane hardstandings, underground cabling, a newly created site entrance, turning heads, a control building and substation compound, a permanent free standing meteorological monitoring (anemometer) mast, a permanent communications mast, temporary meteorological monitoring masts, a temporary construction compound with car parking, a temporary storage area, welfare facilities and two off-site areas of widening to the public road. The proposed turbine layout is shown in Figure 1.4.

1.20 Further details of the Proposed Wind Farm Development are presented in **Chapter 4: Description of Development.**

1.21 The point of connection for the Proposed Wind Farm Development to the national grid system is currently unknown and a number of options are being explored. When the connection method is known, after further detailed surveys and assessment the appropriate consent would be sought by the relevant network operator.

1.22 The application for consent is the culmination of a three year programme of work undertaken by the Applicant and its consultants, during which time the Site's suitability and environmental sensitivities were assessed. The wind regime on the Site has been assessed, from meteorological mast data collected from 2002 to 2007 and a number of design options have been explored resulting from this and from the iterative EIA process (as discussed in **Chapter 3: Design Evolution and Alternatives).**

1.23 The Proposed Wind Farm Development constitutes Section 36 Application, as the proposed capacity is, or exceeds 50 megawatts. While there is no requirement to carry out Pre-Application Consultation (PAC) with the local community or submit a PAC report as part of a Section 36 Application, RES considers community consultation an integral part of the development process. As a responsible developer, RES has undertaken a considerable amount of consultation and wishes to summarise the process within the Consultation Report. RES has submitted a Consultation Report for the Proposed Wind Farm Development to accompany the application for consent, which outlines how and when the local community have been consulted on the Proposed Wind Farm Development.

Applicant

1.24 RES is one of the world's leading independent renewable energy developers with operations across Europe, North America and Asia-Pacific. RES, a British company, has been at the forefront of wind energy development for over 30 years and has developed and/or built over 116 wind farms around the world (or more than 7.5 Gigawatts (GW) of wind capacity) worldwide. In the UK alone, RES currently has more than 1,000 Megawatts (MW) of onshore wind energy either constructed, under construction or consented. In Scotland, RES has developed and/or built eleven wind farms with a total generation capacity of nearly 215 MW. In 2013, RES completed construction of Meikle Carewe Wind Farm in Aberdeenshire.

1.25 RES is active in a range of renewable energy technologies, including the development of large-scale solar and biomass and the delivery of on-site renewable heat and power technologies. In the field of renewable energy and sustainable buildings RES also offers strategic advice to the public and private sectors.

1.26 RES has offices across the UK and worldwide. Drawing on decades of experience in the renewable energy and construction industries, RES has the expertise to develop, construct and operate projects of outstanding quality. From its Glasgow office, RES has been developing, constructing and operating wind farms in Scotland since 1993. RES has a growing team of over 117 staff in Scotland working across a range of disciplines.

Project Team

1.27 The applicant has concurrently appointed a project team to prepare the ES. The members of the project team and their respective roles are presented in Table 1.1.

Table 1.1: Project Team and Specific Technical Contribution

Company	Role
ENVIRON UK Ltd	ES Project Manager, Co-ordinator and compiled the Non-Technical Summary (NTS). Provided specialist input on socio-economics and produced the Socio-economic chapter.
RES Ltd	In-house specialists provided input on the acoustic assessment, electromagnetic interference and related issues, access, transport and traffic, construction and health and safety.
Jones Lang LaSalle	Provided specialist advice on planning and renewable energy policy context and produced the Planning Chapter.
CFA Archaeology Ltd	Provided specialist input on historic environment and produced the Cultural Heritage and Archaeology chapter.
Wallingford Hydrosolutions Ltd	Provided specialist input on geology, hydrogeology and hydrology and produced the Geology, Hydrology, Hydrogeology chapter. Provided specialist input on construction mitigation, including Sustainable Urban Drainage (SuDS).
Land Use Consultants Ltd	Provided specialist advice on design and produced the landscape and visual chapter.
MacArthur Green Ltd	Provided specialist input on ecology, peat and ornithology and produced the ecology and ornithology chapters.
SBA	Provided specialist input on traffic and transport and produced the traffic and transport chapter.
Mott MacDonald Ltd	Produced the peat slide risk assessment.

Structure of the Environmental Statement

1.28 The ES consists of four volumes. The Main Report (Volume 2) of the ES presents an assessment of the likely significant environmental effects of the Proposed Wind Farm Development and non Landscape and Visual Figures. The Non-Technical Summary (Volume 1) is presented as a separate volume, as are the Landscape and Visual Figures (Volume 3) and Technical Appendices (Volume 4). The Main Report is divided into three main sections. The first part comprises introductory chapters 1-6:

- **Chapter 1: Introduction** provides a brief introduction to the scheme, the applicant and the structure of the ES and presents the rationale for the project;
- **Chapter 2: Planning and Policy Context** provides an overview of the climate change, renewable energy and planning policy framework within which the Proposed Wind Farm Development is proposed;
- **Chapter 3: Design Evolution and Alternatives** outlines the design strategy, layout constraints and modifications to the layout and describes the site selection process;
- **Chapter 4: Description of Development** provides a detailed description of the Proposed Wind Farm Development;
- **Chapter 5: Construction and Decommissioning** outlines the proposed programme of site preparation, construction and decommissioning works for the Proposed Wind Farm Development and the management controls that would be implemented during these phases; and
- **Chapter 6: EIA Process & Methodology** sets out the broad method of approach that has been used in the EIA for the Proposed Wind Farm Development.

1.29 The second part of the Main Report (Chapter 7-16) describes the predicted environmental impacts[1] of the development in relation to the following topic areas:

- Chapter 7: Landscape and Visual
- Chapter 8: Ecology
- Chapter 9: Ornithology
- Chapter 10: Cultural Heritage and Archaeology
- Chapter 11: Geology, Hydrology and Hydrogeology
- Chapter 12: Noise
- Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker
- Chapter 14: Access, Traffic and Transport
- Chapter 15: Socio-Economics

1.30 Within each of these chapters, the information is structured in a consistent way, as far as is practicable, as follows:

- Introduction: identifies key objectives and issues;
- Planning Policy Context: summarises the relevant planning policy contained in the Structure Plan and Local Plan and national planning policy and guidance;
- Assessment Methodology: summarises the methods used (desk study, surveys, consultations etc.) in undertaking the EIA;
- Significance Criteria: details criteria against which the significance of predicted impacts is assessed;
- Existing Conditions: summarises the baseline situation, including field survey results where appropriate;
- Identification and Assessment of Predicted Impacts associated with the construction and operational phases of the Development. This includes;

1 The terms impacts and effects have been used interchangeably throughout this report.

- Predicted Impacts: details the predicted impacts (both negative and positive) of the scheme and an assessment of the significance of the impacts. Any uncertainty or risks associated with impact predictions are referred to in the text;
- Mitigation Measures: a summary of measures envisaged to avoid, reduce or remedy predicted significant negative impacts of the scheme;
- Residual Impacts: a summary of predicted impacts remaining following mitigation, indicating the significance of the residual impacts;
- Cumulative Impacts: sets out any potential impacts of a cumulative nature which may arise due to the Proposed Wind Farm Development in combination with other known schemes (other wind farms);
- Future Monitoring Requirements: detailed proposals for monitoring impacts and the effectiveness of mitigation measures (if required); and
- Summary of Impacts: a table summarising the significance of predicted impacts, mitigation measures and residual impacts.

1.31 The assessment section of each chapter is structured in the most logical manner for that particular topic area, whilst maintaining as far as possible the general structure identified above.

1.32 The third part of the Main Report, **Chapter 16: Summary**, presents the overall findings and conclusions of the EIA, with particular emphasis on predicted significant impacts and mitigation measures.

1.33 A stand-alone Planning Statement, Design & Access Statement and Consultation Report have also been produced to accompany the application, but do not form part of this ES.

2 Planning and Energy Policy Context

2.1 This chapter sets out the planning and energy policy context applicable to the Proposed Wind Farm Development. This chapter sets out the relevant policy framework at the international, national, regional and local levels.

Statutory Consents Procedure

2.2 Due to the proposed electricity generation capacity of the Proposed Wind Farm Development exceeding 50 MW, an application for consent is submitted to the Scottish Ministers under the terms of Section 36 of the Electricity Act 1989 (as amended). If Section 36 consent is granted the Scottish Ministers may also give a direction that planning permission for the development is deemed to be granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997 (as amended).

2.3 In considering the application under Section 36, the Scottish Ministers must fulfil the requirements of Schedule 9 (paragraph 3) of the Electricity Act 1989. This requires the Scottish Ministers to consider the '*desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest'*. In addition the Scottish Ministers are required to assess whether the Applicant has fulfilled the requirement to *'do what he* [sic] *reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects'.* While the application for consent will be determined by the Scottish Ministers, The Highland Council (THC) (the local planning authority) is a statutory consultee.

2.4 Following receipt of all views and representations, Scottish Ministers will determine the application for consent in one of two ways:

- grant consent and issue deemed planning permission, with or without conditions attached; or
- reject the proposal.

2.5 In determining whether to grant section 36 consent, the Development Plan is a relevant consideration, along with other material considerations. This chapter outlines and describes the Development Plan and the national planning policy framework of relevance to the EIA.

Structure of this Chapter

2.6 This chapter is structured in a series of subsections, providing a review of the relevant policies within the Development Plan (The Highland-wide Local Development Plan (HwLDP)), Supplementary Planning Guidance (SPG), Interim Supplementary Guidance (SG) and relevant national policy statements and advice. There are a number of individual policies within the HwLDP that are of relevance to the Proposed Wind Farm Development, and those policies that are of most relevance are described in this Chapter. Reference is also made to the Moray Structure Plan (2007) and the Moray Local Plan (2008), owing to the eastern and southern boundaries of the Site being located close to the boundary between the Highland Council and Moray Council areas.

2.7 In terms of planning policy supplementary to the Development Plan, The Highland Renewable Energy Strategy and Planning Guidelines (HRES, 2006) has some relevance and provides detailed policies regarding renewable energy development. THC has also published Interim SG for 'Onshore Wind Energy' which is a relevant material consideration.

2.8 The HwLDP, national policy and guidance, the HRES and the Interim SG provide the relevant planning policy context against which to assess the Proposed Wind Farm Development.

2.9 It is important to note that this chapter does not include an assessment of the Proposed Wind Farm Development's accordance with the Development Plan and other material considerations. This would inevitably involve a degree of subjective interpretation, which is contrary to advice on ES preparation, including good practice guidance on EIA which states that discussions of planning policy in an ES should be objective. It should be noted that the Applicant has submitted a separate Planning Policy Statement, which sets out the assessment of the relevant Development Plan policies, national and renewable energy policy and other material considerations in the context of the Proposed Wind Farm Development. The Planning Statement does not form part of the ES.

Renewable Energy Policy Framework

European Energy Policy

2.10 In January 2008 the European Commission published a '20-20-20' targets package. This included proposals for :

- A reduction in the EU's greenhouse gas emissions of at least 20% below 1990 levels;
- Increasing the proportion of final EU energy consumption from renewable sources to 20%; and
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

2.11 Targets are to be achieved by 2020, as set out in the Renewable Energy Directive from the European Commission, which was published in its final form in March 2009.

2.12 The 20% is split between Member States. For the UK, the European Commission's proposals include 16% reduction in UK greenhouse gas emissions by 2020 and for 15% of all energy consumed in the UK to come from renewable sources by 2020. This is an important starting point as such targets are binding upon the UK, and such targets require to be met from renewables contributions from Scotland as well as other areas of the UK.

United Kingdom Policy

2.13 The UK Government retains control of the overall direction of energy policy including the attainment of UK national targets on renewable energy generation. Since devolution in 1999, some energy policy issues have been devolved to Scotland such as energy efficiency and renewable energy (including consents for generating plants covered by the Electricity Act 1989).

2.14 In light of the significant increase in renewable energy generation required by the EU Directive, the UK Government published a strategy in July 2009 in order to implement the obligations contained within the Directive and to enable a significant increase in the contribution that renewable energy makes to energy generation in the UK. In terms of the UK policy position, the following key policy documents are relevant and are referred to below:

- The UK Renewable Energy Strategy;
- The UK Low Carbon Transition Plan (2009);
- The Annual Energy Statement & The Pathways Analysis (both of 2010);
- The National Renewable Energy Action Plan for the UK (2010);
- The Climate Change Committee's 'Renewable Energy Review' (2011);
- The UK Renewable Energy Roadmap (2011);
- The Electricity Market Reform White Paper (2011);
- UK Government Consultation for Banding Review (2011); and
- The Carbon Plan (2011).

UK Renewable Energy Strategy (2009)

2.15 The UK Renewable Energy Strategy (UKRES) states that the UK needs to radically increase the use of renewable electricity. The document sets out the means by which the UK can meet the legally binding target of 15% of energy consumption from renewable sources by 2020. This will mean a very substantial increase in the share of renewables in under a decade.

2.16 The UKRES contains a 'lead scenario', which suggests that more than 30% of electricity should be generated from renewables in the UK by 2020, which would be up from approximately 5.5% in 2009. The majority of this is expected to come from wind power, both on and offshore.

2.17 A key element of the new strategy is that it sets out the EU requirement for reporting to the EU on the achievement of delivery against the trajectory set for the 2020 target.

2.18 Under the Directive, the UK has interim targets to achieve the following shares for renewables in the energy mix:

- 4% in 2011 – 2012;
- 5.4% in 2013 – 2014;
- 7.5% in 2015 – 2016; and
- 10.2% in 2017- 2018.

2.19 The UKRES refers explicitly to economic and employment opportunities: these are highlighted and the aspiration is for the UK to be at the forefront of global competition in the low carbon economy. The Government estimates that the Strategy will deliver a range of benefits including:

- Putting the UK on a path towards decarbonising the production of energy in the UK, alongside nuclear and carbon capture and storage.
- Contributing to the security of energy supplies in the UK through reducing demand for fossil fuels of around 10% and gas imports by between 20 – 30% against forecast use in 2020.
- Bring outstanding *business opportunities* and enable the UK to restructure into a low carbon economy, providing around £100 billion of investment opportunities and contribute to the creation of up to 0.5 million more jobs in the UK renewable energy sector.
- The strategy is expected to deliver significant environmental benefits, in particular by contributing to global action against climate change. It recognises that there will also be some pressures on the local environments and natural heritage from new infrastructure provision.

2.20 The document makes it clear that the UKRES is an integral part of the Government's overall UK Low Carbon Transition Plan and that the Devolved Administrations have a leadership role to undertake. The Strategy was published by the UK Government: the policies to meet the 2020 targets will be taken forward in England, Scotland and Wales, Great Britain or on a UK – wide basis as appropriate and in accordance with each devolution arrangement. The document makes it clear that each of the Devolved Administrations is setting out its own plan to increase renewable energy use and that "*the UK Government and the Devolved Administrations are working together to ensure that our plans are aligned*".

The UK Low Carbon Transition Plan (2009)

2.21 Along with the UKRES, the UK Government published the UK Low Carbon Transition Plan as a White Paper in July 2009. The plan seeks to deliver greenhouse gas emission cuts of 18% on 2008 levels by 2020 (and over a third reduction on 1990 levels), and emphasises that the UK will need to drive major changes to the way energy is used and supplied.

2.22 It seeks to ensure that the UK will get 40% of electricity from low carbon sources by 2020, with policies to produce approximately 30% of UK electricity from renewables by 2020, by substantially increasing the requirement for electricity suppliers to sell renewable electricity.

2.23 The White Paper explains that the UK Government has put in place the world's first legally binding target to cut emissions by 80% by 2050 and it has set five year "*carbon budgets*" to 2022 to 'keep the UK on track' and which provides a clear pathway for reducing emissions in the future (page 6). The White Paper for the first time sets out how these budgets will be met.

2.24 The White Paper also makes the point that the introduction of carbon budgets introduces a

new imperative: they are legally binding and must be met.

National Renewable Energy Action Plan for the UK

2.25 The Government also published the 'National Renewable Energy Action Plan for the United Kingdom'[2] in July 2010. It states (page 4) that:

"The UK needs to radically increase its use of renewable energy. The UK has been blessed with a wealth of energy resources. …As we look forward, we need to ensure that we also make the most of our renewable resources to provide a secure base for the UK's future energy needs."

2.26 This Action Plan (page 4) also makes reference to the independent UK Committee on Climate Change (CCC) and that "*it will review the renewables target and provide advice on increasing the level of ambition*".

Committee on Climate Change

2.27 The CCC provided advice by letter[3] to the Secretary of State for Energy on 9th September 2010 and with regard to the renewable energy ambition for 2020 stated:

"The envisaged contribution from renewable electricity (to account for around 30% of total generation by 2020, compared with 6.6% in 2009) is appropriate in the context of the need to substantially decarbonise the power sector by 2020, on the path to meeting the economy wide target to reduce 2050 emissions by 80% relative to 1990 levels. Investment now in a broad range of renewables technologies, but predominantly onshore and offshore wind, will directly contribute to required decarbonisation…it could also provide economic opportunities for UK based firms".

2.28 The letter added (page 2) that meeting the 2020 renewable energy target would require a step change in the rate of progress and that:

"Our forward indicators for renewable electricity generation set out key actions that would deliver the 2020 target. A ramping-up in the pace of investment is required (around 1 GW of wind generation was added to the system in 2009, compared to over 3 GW required annually by the end of the decade."

2.29 It adds that failure to address key risks would limit the scope for investment and would imply a reduced share of renewable electricity in 2020. Such risks would include the need to "*reduce the planning application period for new renewable projects and increase the planning approval rate*".

2.30 The 'Renewable Energy Review' (published by the CCC on 9 May 2011) ("the RER") expresses the view that whilst the UK Government's 2020 ambition is appropriate, its achievement will require large-scale investment and new policies to help support technology innovation and to address barriers to uptake in order to suitably develop renewables as an option for future decarbonisation. The RER also acknowledges that, compared with onshore wind, most other renewable energy generation technologies are expensive and likely to remain so until at least 2020, and in some cases considerably later.

2.31 Consequently, onshore wind is a key element of the portfolio of low carbon generation technologies which the CCC says is required to ensure that the UK's renewable energy targets and climate change commitments are met. However, the RER recognises that further approvals will be required in order to deliver the renewable energy (and, in particular, the onshore wind) ambition which is advocated by the UKRES.

The UK Renewable Energy Road Map (July 2011)

Government Commitment

2.32 DECC issued the 'UK Renewable Energy Roadmap' in July 2011, alongside the Government's Electricity Market Reform White Paper.

2.33 The introduction explains that the Government's goal is to ensure that 15% of UK energy demand is met from renewable sources by 2020. At paragraph 1.3, it explains that the ambition extends beyond 2020 and there is reference to the recent advice from the CCC which has concluded that there is scope for penetration of renewable energy to meet 30% – 45% of all energy consumed in the UK by 2030.

2.34 The Roadmap sets out an analysis of recent trends in renewables deployment and the pipeline of projects that could come forward before 2020. It addresses the barriers to be overcome and sets out a targeted programme of action which the Government is taking in order to increase renewables deployment (paragraph 1.8).

2.35 The Roadmap sets out a delivery plan to achieve the UK's renewable energy target over the next decade, based upon potential deployment levels and current constraints. In the main, the "*actions to address barriers*" summarise policy measures already being undertaken, with some new ones. The foreword states that the actions are intended to "*accelerate renewable energy in the UK*" (page 4).

2.36 The more significant parts of the Roadmap relate to forecast costs and deployment levels. The document is endorsed by DECC, Welsh, Scottish and Northern Ireland Governments and is to be reviewed and refreshed annually.

Onshore Wind

2.37 The Roadmap focuses on the 8 technologies that have the greatest potential to help the UK meet the 2020 target in a cost effective and sustainable way, or offer great potential for the decades that follow.

2.38 In terms of onshore wind: the 'central range' for the deployment of onshore wind indicates that this technology could contribute up to 13 GW by 2020. This level of capacity would equate to an annual growth rate of some 13%.

2.39 Challenges to deployment include minimising investment risk, reform of the planning system, overcoming radar issues and ensuring cost effective grid investment and connection. The

2 The National Renewable Energy Action Plan for the United Kingdom, under Article 4 of the Renewable Energy Directive 2009/28/EC, July 2010.

3 Letter from Lord Turner, Chairman of the Committee on Climate Change to the Rt. Hon Chris Huhne MP the Secretary of State for Energy and Climate Change, dated 9th September 2010.

reform of the planning system is to include advice to local authorities to identify opportunities for the deployment of renewables using analysis from regional studies. The majority of the capacity is expected to come from large scale projects over 5 MW.

2.40 The existing planning pipeline is referred to at paragraph 3.11 and it is stated that it could potentially deliver 8.9 GW. At paragraph 3.13, however, the Roadmap makes it clear that there is still a need to tackle challenges to deployment and that new proposals will also be required to come forward to meet the 2020 ambition, as well as longer term decarbonisation objectives.

2.41 There is reference to the forthcoming Electricity Market Reform (EMR) which will be critical to addressing matters related to investment risk, particularly in relation to the need for a smooth transition from the Renewables Obligation (RO) and new banding of support levels.

2.42 The Roadmap is a recent expression of UK Government policy on renewable energy and the strategy for its deployment, which should be accorded significant weight.

The Electricity Market Reform

2.43 The EMR White Paper was the precursor to the Energy Bill 2012 and section 2.8 states that the Energy Bill is intended to implement the key aspects of EMR by introducing major reforms that will result in greater stability and certainty for investors in energy infrastructure. It adds that EMR reforms could help support 250,000 jobs in the energy sector.

2.44 The Energy Bill was subject to its 1st reading in the House of Commons on the 29 November 2012 and was subject to its 1st reading in the House of Lords on 5th June 2013. It is anticipated that the Bill will reach the statute book towards the end of 2013, after passing the House of Lords Committee Stages by the end of July 2013. The following summarises the key aspects of the White Paper.

The Use of Onshore Wind as a Technology

2.45 Onshore wind is described as a "*mature technology*" (paragraph 2.3.25), in which the market can be prepared to invest with some certainty. It is also acknowledged that "*significant parts of the UK's generation capacity are located in Northern Ireland, Scotland and Wales" (paragraph 9.1.4).*

Policy Targets and the Wider Context

2.46 It is stated that, "The policy proposals within this White Paper form part of a much wider DECC agenda aimed at energy decarbonisation and security of supply". The decarbonisation of electricity generation informs one of the three "key objectives" of the EMR (paragraph 1.3) and it is acknowledged that such an objective is implicitly linked to the issue of climate change and the achievement of national and European renewable energy targets.

2.47 Chapter 1 of the White Paper describes the "*vision*" which is to be achieved by 2030:

"By 2030, we will have achieved a reduction in our greenhouse gas emissions across the whole economy in line with our carbon budgets and will be firmly on track to achieving at least an 80 per cent reduction by 2050. We have substantially decarbonised electricity supply and also get more than one third of electricity generation from renewable sources… Wind power forms a substantial part of our generation mix with cost competitive wind turbines both on and offshore." (our emphasis)

"Ensuring the future security of electricity supplies" is the first of the primary objectives in the EMR. Wind power is seen as being a reliable and stable future technology, which should form part of the "*generation mix*" in accordance with a range of advancing and currently infant renewable technologies.

The Renewables Obligation and the Consultation on Banding Review

2.48 The framework of the Renewables Obligation (RO) is creating significant demand for renewable generation and the market has reacted by bringing forward proposals for new renewable plant. A large proportion of these proposed new developments are for onshore wind-powered generation in the UK.

2.49 The Executive Summary of the document states that the Coalition Government has made clear its commitment to increasing the deployment of renewable energy across the UK (page 8). The Government is proposing adjustment to the RO banding to deliver the deployment trajectory set out in the UK Renewable Energy Roadmap. The UK (and Scottish) Government is proposing to reduce support for onshore wind by 10% to 0.9 ROCs/MWh) which reflects the technology maturity and cost competitiveness of onshore wind. Onshore wind is specifically addressed at page 29 et seq in the UK consultation document and it states that the analysis informing the consultation has concluded that:

"onshore wind within the UK still has significant deployment potential. Utilising the best onshore wind sites, together with the repowering of existing sites with newer, more efficient turbines, could provide an increase from present levels to deliver up to 13GW of capacity by 2020."

2.50 In terms of RO support the document states (paragraph 3.7) that:

"as one of the most cost effective and developed of all the renewable energy technologies, we recognise the continuing significance of onshore wind for achieving our renewable energy target." (our emphasis)

The Carbon Plan (2011)

2.51 The Coalition Government issued the Carbon Plan 'Delivering our Low Carbon Future' in December 2011. It sets out the Government's plans for achieving the emissions reductions committed to in the first four Carbon Budgets covering the overall period from 2008 to 2027. These are related to the legally binding targets to reduce the UK's greenhouse gas emissions as set out in the Climate Change Act 2008. The Plan also sets out how the UK will achieve de-carbonisation within the framework of the Government's overall energy policy.

2.52 The vision, summarised at paragraph 10 (page 4) states: "if we are to cut emissions by 80% by 2050, there will have to be major changes in how we use and generate energy…. electricity will need to be decarbonised through renewable and nuclear power, and the use of carbon capture in storage (CCS)".

2.53 With regard to electricity, paragraph 16 sets out the three parts of the UK Government's expected generation portfolio, namely renewable power, nuclear and coal and gas fired power stations fitted with CCS. Paragraph 43 states that the power sector accounts for some 27% of UK total emissions by source and that by 2050, emissions from the sector need to be close to zero. Added to this, with the potential electrification of heating, transport and industrial processes it is estimated that electricity demand may rise between 30 and 60% and in such circumstances, "*we may need as much as double todays electricity capacity to deal with peak demand*" (paragraph 44).

2.54 Paragraph 45 reiterates that while the overall direction is clear, there are major uncertainties over both the most cost effective mix of technologies and the pace of transition. It adds that "*the Government is committed to ensuring that the low carbon technologies with the lowest costs will win the largest market share*". Therefore whilst there is some flexibility in the overall eventual mix that will constitute the future UK generation platform, wind energy as a low cost renewable technology has an important place.

2.55 Paragraph 46 states that over the next decade:

"We need to continue reducing emissions from electricity generation through increasing the use of gas instead of coal, and more generation from renewable sources. Alongside this, we will prepare for the rapid decarbonisation required in the 2020s and 2030s by supporting the demonstration and deployment of the major low carbon technologies that we will need on the way to 2050."

2.56 The Government sets out its commitment to a revised fiscal mechanism for stimulating renewable investment and states that the introduction of Feed in Tariffs with Contracts for Difference from 2014 will provide "*stable financial incentives for investment in all forms of low carbon generation*".

Scottish Government Policy and Renewable Energy Generation Targets

2.57 Over the past few years Scottish Government has legislated and has also issued a large number of policy documents on climate change and renewable energy. In this section the following are briefly referred to, with key policy objectives and targets highlighted:

- The Climate Change (Scotland) Act 2009;
- The Scottish Renewables Action Plan (2009);
- A Low Carbon Economic Strategy for Scotland, - 'Scotland – a Low Carbon Society' (2010);
- 2020 Routemap for Renewable Energy in Scotland (2011);
- Draft Electricity Generation Policy Statement 2012; and
- 2020 Routemap Update.

The Climate Change (Scotland) Act 2009

2.58 The Climate Change (Scotland) Act 2009 received Royal Assent on 4 August 2009. Part 1 of the Act sets the statutory framework for greenhouse gas emission reductions in Scotland by setting an interim (world leading) 42% reduction target for 2020 and an 80% reduction target for 2050, from the baseline, which for CO2 is based on 1990 emission levels. Part 1 of the Act also requires The Scottish Ministers to set annual targets in secondary legislation, for Scottish emissions from 2010 to 2050 to ensure that the 2050 target is attained.

2.59 Part 3 of the Act places duties on the Scottish Ministers requiring them to report regularly to the Scottish Parliament on Scotland's emissions and on the progress being made towards meeting the emissions reduction targets as set out in the Act.

2.60 Reductions in greenhouse gas emissions for energy generation are a key component to achieve the targets referred to in the above sections. The Act places a statutory requirement on The Scottish Ministers to set appropriate levels for energy generation to contribute to meeting the targets.

The Scottish Renewables Action Plan (2009)

2.61 The Scottish Government issued the 'Renewables Action Plan' (RAP) in June 2009. This identifies what needs to happen in the renewables sector in order to achieve Government objectives.

2.62 The RAP refers to the imperative for action to address climate change (demonstrated by Scotland's world leading carbon reduction target of 42% (see the reference to the Climate Change (Scotland) Act above). It makes reference to the Scottish Government's commitment to achieve a headline target of 20% of total Scottish energy use coming from renewable sources by 2020. Specific targets refer to those relating to electricity demand by 2020 (now set at 80%). The RAP sets out the framework for action in the specific area of renewable energy.

2.63 Key objectives are summarised as follows:

- To establish Scotland as a UK and EU leader in the field;
- To ensure maximum returns for the Scottish domestic economy; and
- To meet targets for energy from renewables, and for emissions reductions, to 2020 and beyond; (RAP, Executive Summary, page 5).

2.64 The RAP makes it clear that the Scottish Government is continuing to engage very closely with the UK Government on the shape and scope of renewable energy legislation and the financial incentives created thereby. There is reference to the Renewables Obligation (RO) mechanism and the RAP states that the Scottish Government is working with "*UK colleagues on the further changes to the RO required to align it with the demands of the EU 20% target….*" (page 17).

2.65 Section 4 of the RAP highlights that each technology will have its own part to play in helping Scotland meet its energy targets "*and ministers are committed to a diverse renewables mix to maximise the scope to match supply with demand and to enhance security of supply*" (page 20).

2.66 Energy consents and planning are discussed in section 8 of the RAP. Specific actions are identified including the need to:

- Create a supportive planning landscape;

- Ensure the planning and consenting regimes better support investment in renewables in Scotland; and
- Continue to work with Local Planning Authorities to develop their strategic locational guidance in line with planning guidance and to ensure that the planning system produces decisions that are efficient, transparent, consistent and timely (page 37).

2.67 The document (page 77) explains that onshore wind is expected to provide the majority of capacity in the timeframe for the Government's interim and 2020 renewable electricity targets.

A Low Carbon Economic Strategy for Scotland: 'Scotland – a Low Carbon Society'

2.68 The Scottish Government issued this policy document In November 2010. In the foreword, John Swinney MSP, Cabinet Secretary for Finance and Sustainable Growth, stated:

"This low carbon economic strategy builds on the responses from Scottish business, industry and research base… it provides a Scottish focus, alongside UK Government initiatives, on what action is required to transform Scotland's industries and infrastructure, into exemplars to the world of what can be achieved in the pursuit of a low carbon economy."

2.69 In the report (page 6), the Government states that the aspiration is that within less than 10 years, 80% [now 100%] of electricity will be generated from renewables. In addition, the Government has developed an ambitious set of targets which will include the decarbonisation of electricity generation by 2030.

2.70 The Low Carbon Economic Strategy is an integral part of the Government's overall Economic Strategy and seeks to establish strong policy direction around Scotland's key low carbon economic opportunities. On page 10 of the document, it is stated that "*Scotland has the natural resources to become the green energy power house of Europe*".

2.71 The energy sector is referred to in section 2.2 of the Report and onshore wind is specifically addressed on page 49. The Report states that:

"it is important to recognise that onshore wind is still the technology that can make the most immediate positive impact on our low carbon economy, and therefore the Scottish Government will continue to encourage large, medium and small scale developments that are sited appropriately."

2020 Routemap for Renewable Energy in Scotland

2.72 The Scottish Government published the Routemap in July 2011 (hereafter referred to as 'the Routemap') at the same time that the UK Government published the UK Renewables 'Roadmap' (referred to above).

2.73 The Executive Summary of the Routemap notes that:

"The Routemap for Renewable Energy in Scotland 2011 is an update and extension to the Scottish Renewables Action Plan 2009… This updated and expanded Routemap reflects the challenge of our new target to meet an equivalent of 100% demand for electricity from renewable energy by 2020". (page 3)

2.74 The Routemap is therefore an important Scottish Government policy document. The Executive Summary concludes by stating that:

"Across all scales of renewable generation, from householder to community to large-scale commercial schemes, the Scottish Government is working to make Scotland the renewables powerhouse of Europe. The benefits are not only in terms of energy generation and future security of supply, but can underpin our economic recovery over the next decade and beyond.

This Routemap for Renewable Energy in Scotland sets out how we can meet our challenging targets in harmony with the local environment and make a wider contribution to emission reductions through the displacement of fossil fuel generation". (page 8)

2.75 Chapter 1 of the Routemap is entitled 'Scotland's renewables ambition and paths to delivery'. It is noted that the new renewables target of 100% equates to the equivalent of circa 16 GW of installed capacity, which:

"is based on the fundamental wealth of renewables resource available, our analysis of deployment trajectories on the onshore side…and our concerted efforts to ensure a supportive policy framework for growth". (page 17)

2.76 As explained below, there is a significant shortfall against this target. The Routemap also provides an increase in the Scottish Government's overall renewable energy target to 30% by 2020.

2.77 The Routemap specifically recognises the 'scale of the challenge' that requires to be addressed to meet the revised 2020 targets. It is noted that meeting the challenge "*will be heavily dependent on regulatory processes, which we will seek to influence but over which we do not currently have control*" (page 19).

2.78 The Routemap provides a 'synopsis of the main challenges' that require to be addressed to meet the 2020 renewables targets, one of which is 'consents and planning'. With respect to consents and planning, the Routemap identifies that a "*Further increase in consenting/deployment rates [is] required…*" (page 19).

2.79 Chapter 1 of the Routemap also provides an analysis of past deployment trajectories for onshore renewables (the amount of renewables that has been deployed over recent years). The analysis provides four deployment 'scenario' projections up to October 2021, based on different deployment assumptions.

2.80 The Routemap illustrates that the scenarios considered will not meet the 2020 target of 100% Scottish electricity consumption being met from renewable sources by 2020. Importantly, the Routemap states that "*The successful delivery of the capacity required to deliver the equivalent of 100% of Scottish electricity consumption will demand a significant and sustained improvement over the deployment levels seen historically*" (page 26).

2.81 Chapter 2 of the Routemap is entitled 'Crosscutting Challenges' and notes that there are a number of cross cutting challenges that require to be faced by all sectors that make up the renewables industry if the 2020 targets are to be realised. One of the 'Crosscutting Challenges' identified is ''Planning and Consents'.

2.82 The Routemap states that in order to meet the 2020 target of 100% renewables "a further increase in consenting and deployment rates will be required…This will be achieved by driving excellence in planning and consenting processes…" (page 40).

2.83 In order to increase the rate of deployment of renewables, the Routemap sets out a number of priorities for the planning and consenting systems, which include:

- Further streamlining the consenting process;
- Simplifying planning advice;
- Overcoming barriers to deployment, particularly aviation/radar issues but also including all relevant environmental issues;
- promoting community engagement in the design and siting of development proposals;
- Developing the agenda and advice on cumulative impact and environmental issues;
- Promoting community benefit; and
- Driving best practice.

2.84 In addition to the above, the Routemap also states that the Scottish Government will 'tackle barriers to deployment' and examples of the matters that the Scottish Government proposes to tackle include:

- "*Continue engagement at UK level through the Aviation Management Board and Aviation Advisory Panel, including to promote the development of technical solutions.*
- *Chair and facilitate the SW Scotland Regional Aviation Solution Group.*
- *Finalise planning advice on the use of suspensive conditions for aviation issues in planning consents.*
- *Facilitate engagement and promote cooperation between developers, air navigation service providers and other aviation stakeholders.*
- *Continue engagement over the issue of deployment around the Eskdalemuir Seismological Monitoring Station, including working towards MoD acceptance of technological solutions, supporting required research and facilitating engagement between stakeholders.*
- *Lead the European GP Wind project, with a view to overcoming barriers presented by environmental and community issues through the development and promotion of good practice.*" (page 41)

2.85 Chapter 3 of the Routemap provides a specific route map for 'Onshore Wind' and is entitled 'Sectoral Routemaps'. The introduction notes that:

"The Government is committed to the continued expansion of portfolio of onshore wind farms to help meet renewables targets, with a robust planning system providing spatial guidance, a clear policy framework and together with a timely and efficient processing of Section 36 Electricity Act and planning applications…Onshore wind turbines can make a very large contribution to the progress to Scotland's renewable electricity target, and help establish Scotland's reputation as rapidly becoming the green powerhouse of Europe thanks to its underlying political commitment to make it happen." (page 66)

2.86 Under the heading 'Key Actions', the Routemap also identifies that the planning system "*must continue to balance environmental sensitivities with the need to make progress on renewables targets*" (page 70). This is a very important policy statement as it highlights that decision makers should be balancing the environmental effects of a development against the contribution that a development would make to achieving the 2020 targets.

2.87 The Routemap provides conclusions within Chapter 4 and states that:

"This Routemap sets out a comprehensive path of actions to deliver on Scotland's ambition to be the green powerhouse of Europe. By setting Europe's most ambitious target for renewable electricity and putting in place the measures required to deliver it we are creating a competitive advantage for Scotland which will secure a prosperous and sustainable low carbon economy for the future." (page 115)

Draft Electricity Generation Policy Statement 2012, Scotland - A Low Carbon Society

2.88 The Scottish Government issued a Draft Electricity Generation Policy Statement (EGPS) for consultation in early 2012. The consultation period ran until 7th May 2012. The draft EGPS states at paragraph 1 of the Executive Summary that electricity generation and the economic and environmental benefits which could arise from a shift from fossil fuel generation to a portfolio comprising renewable and cleaner thermal generation are matters of considerable importance to the Scottish Government.

2.89 The EGPS is the most recent policy statement issued by the Scottish Government covering renewable energy. It examines the way Scotland generates electricity and considers the changes necessary to meet the various targets set by the Scottish Government.

2.90 Paragraph 2 states that the report is built upon a sustainable, low carbon vision of Scotland's energy future and it emphasises "*the need for a rapid expansion of renewable electricity across Scotland…*" The report takes account of the changing policy context in Scotland, the UK and the EU since the National Planning Framework was published in June 2009.

2.91 Paragraph 8 states that the report will assist the Scottish Government to comply with further statutory requirements under the Climate Change Scotland Act 2009. It also reiterates that the Government is committed to securing the transition to a low carbon economy, which is one of the six 'strategic priorities' laid out in the refreshed Government Economic Strategy.

2.92 The report summarises the Scottish Government's targets and these are set out as:

- Delivering the equivalent of at least 100% of gross electricity consumption from renewables by 2020 as part of a wider, balanced electricity mix;
- Enabling local and community ownership of at least 500 MW of renewable energy by 2020;
- Seeking increased interconnection and transmission upgrades capable of supporting projected growth and renewable capacity.

2.93 The report highlights that these targets underpin the Government's vision of a stable and desirable future generation mix for Scotland, built around the following key principles (paragraph 13):

- A secure source of electricity supply;
- At an affordable cost to consumers;

- Which can be largely de-carbonised by 2030;
- And which achieves the greatest possible economic benefit and competitive advantage for Scotland.

2.94 In term of economic benefit, the report states that it is expected that there would be, over the decade to 2020, from renewables alone, a provision of up to 40,000 jobs and £30 Billion of investment to the Scottish economy and a transformational opportunity for local ownership and benefits.

2.95 Paragraph 15 states that the 2020 target:

"is a challenge – to the energy supply sector, to our renewable industry and innovators and to Scotland's communities; it is both a statement of intent and a rallying call, embodying our firm belief that Scotland can and must exploit its huge renewables potential to the fullest possible extent – to help meet demand here and in Europe. It is as much about the value and importance of the journey as it is about the destination."

2.96 Paragraph16 states that the Government estimates that the 100% target will require around 14-16 GW of installed capacity to be deployed.

2.97 Figure 1 (page 8) in the report illustrates that, at the present time, the status of renewable capacity is broadly as follows:

- Installed capacity – 4.4 GW;
- Under construction – 1.1 GW;
- Resolution to consent – 2.2 GW;
- In the planning system – 4 GW;
- In the Appeal process – 0.5 GW; and
- In 'scoping' – 16.6 GW.

2.98 Page 9 of the report explains that the UK target is to produce 15% of all energy from renewable sources and an estimated 30% of electricity from renewable sources by 2020 and that this:

"will require connection to Scotland's vast energy resource and we will continue to work to connect Scotland to an ever more integrated UK and EU market."

2.99 The report cross refers to the 2020 Routemap for renewable energy in Scotland. Paragraph 29 reiterates the EU context and states that Scotland has the potential to make a "*major contribution to the EU's overall renewables target*".

2020 Renewable Routemap for Scotland - Update

2.100 On 30th October 2012 the Scottish Government issued an update to the Routemap entitled '2020 Renewable Routemap for Scotland - Update' ("The Update"). The Update contains a Ministerial Foreword which states that the document summaries the progress made in the renewable energy sector, but it also sets out what still "*needs to be done*" and the ways in which these tasks are being approached.

2.101 The Foreword refers to a new interim pre-2020 target that renewable electricity generation should account for the equivalent of 50% of Scottish demand by 2015. It adds that "*the vast majority of this new target will still be met by hydro and onshore wind*".

2.102 Paragraph 1.2 states that given there is a positive trajectory towards the 2020 target: "*the time is now right to set another ambitious but achievable interim target to help map the way towards 2020*". This, as noted above, is set as the equivalent of 50% of Scottish demand for electricity by the end of 2015.

2.103 Paragraph 1.4 of the update states that the Government is formally adopting this new interim target "*as the next vital milestone in our journey towards the 2020 target of 100%*".

'Renewable Energy' Prepared by Audit Scotland (September 2013)

2.104 In September of 2013 Audit Scotland published a report on renewable energy, setting out an analysis of the Scottish Governments policy on renewable energy, progress to meeting targets, funding barriers and leadership. The report notes that in terms of strategy *"The Scottish Government has a clear and consistent strategy for developing renewable energy"*

2.105 In terms of the progress towards meeting the Scottish Governments renewable energy generation targets the report identifies that *"Meeting the renewable electricity target by 2020 relies on the continued expansion of wind technology…To meet the 2020 target, average annual increases in installed capacity need to double"* (page 24)

2.106 Further analysis of this report is provided within the accompanying Planning Statement.

The Development Plans

2.107 Under the terms of the Planning Acts[4] and associated Regulations, all Councils are required to prepare and keep up-to-date a Development Plan covering their administrative areas.

2.108 The Development Plan applicable to the Proposed Wind Farm Development is the HwLDP. The Moray Development Plan and the Cairngorms National Park Development Plans are also of some relevance, although they do not cover the geographic area of the Site.

2.109 The HwLDP deals with both strategic as well as local planning matters. The Highland Council adopted the HwLDP on 5 April 2012 and it supersedes the previous Development Plan covering the site with the exception of some Local Plan designations and other minor matters. The elements of the adopted Local Plans that remain in force are included in a retention schedule, which is provided as Appendix 7 to the HwLDP. There are no aspects of the retained Local Plans that are relevant to the assessment of the Proposed Wind Farm Development.

2.110 The Moray Development Plan consists of the Moray Structure Plan (2007) and the Moray Local Plan (2008). The Cairngorms National Park (CNP) Development Plan comprises the Moray Structure Plan (2007) and the Cairngorms National Park Local Plan (2010).

[4] The Town and Country Planning (Scotland) Act 1997 as amended by the Planning etc (Scotland) Act 2006

The Highland Wide Local Development Plan

Aims and Objectives

2.111 Section 4 of the HwLDP sets out the spatial strategy for the area. Paragraph 4.1 states "…it is important to ensure that development is, in the first instance, directed to places with sufficient existing or planned infrastructure and facilities to support sustainable development" (page 10). In line with Scottish Planning Policy (SPP), it emphasises that the national context is one of support for sustainable economic growth.

2.112 Section 5 of the HwLDP sets out the vision for the Highland Council Area and is as follows: "by 2020, Highland will be one of Europe's leading regions. We will have created sustainable communities, balancing population growths, economic development and the safeguarding of the environment across the area, and have built a fairer and healthier Highlands" (page 12). The Council have translated the vision into what this means in land use planning terms and this also includes "ensuring that development of renewable energy resources are managed effectively with clear guidance on where renewable energy developments should and should not be located" (page 12). The HwLDP translates the 'Vision' into land use planning terms under the following headings:-

- enable sustainable Highland communities;
- safeguard the environment;
- support a competitive, sustainable and adaptable Highland economy;
- achieve a healthier Highlands; and
- provide better opportunities for all and a fairer Highland.

2.113 Section 8 of the HwLDP specifically refers to the Inner Moray Firth area, and it states that by 2030 the Inner Moray Firth area will:

- have increased the number of jobs, people and facilities;
- have a growing city;
- have safeguarded and enhanced its special places;
- have made it easy for people and wildlife to move about through a green network;
- have more efficient forms of travel;
- have resolved its infrastructure constraints;
- have diversified its economy; and
- be regenerated and renewed.

Policies of Relevance

2.114 This section sets out the relevant policies of the Development Plan and the policies considered to be of relevance are as follows:

- **General Policies** – Policy 28 'Sustainable Design' and Policy 31 ' Developer Contributions';
- **Renewable Energy Policy** – Policy 67 'Renewable Energy Developments`';
- **Landscape / Natural Heritage Policy** – Policy 58 'Protected Species', Policy 59 'Other important Species', Policy 60 ' Other Important Habitats and Article 10 Features', Policy 51 'Trees and Development' and Policy 61 ' Landscape';
- **Cultural and Built Heritage Policy** – Policy 57 ' Natural, Built and Cultural Heritage'; and
- **Soils and Hydrology Policy** – Policy 53 'Minerals', Policy 55 'Peat and Soils' and Policy 64 'Flood Risk'.

2.115 These policies are set out below.

Renewable Energy Policy

2.116 **Policy 67 Renewable Energy Developments** is the key policy of relevance for dealing with the proposed development. It states:

"Renewable energy development proposals should be well related to the source of the primary renewable resources that are needed for their operation. The Council will also consider:

- *the contribution of the proposed development towards meeting renewable energy generation targets; and*
- *any positive or negative effects it is likely to have on the local and national economy;*

and will assess proposals against other policies of the development plan, the Highland Renewable Energy Strategy and Planning Guidelines and have regard to any other material considerations, including proposals able to demonstrate significant benefits including by making effective use of existing and proposed infrastructure or facilities.

Subject to balancing with these considerations and taking into account any mitigation measures to be included, the Council will support proposals where it is satisfied that they are located, sited and designed such that they will not be significantly detrimental overall, either individually or cumulatively with other developments (see Glossary), having regard in particular to any significant effects on the following:

- *natural, built and cultural heritage features;*
- *species and habitats;*
- *visual impact and impact on the landscape character of the surrounding area (the design and location of the proposal should reflect the scale and character of the landscape and seek to minimise landscape and visual impact, subject to any other considerations);*
- *amenity at sensitive locations, including residential properties, work places and recognised visitor sites (in or outwith a settlement boundary);*
- *the safety and amenity of any regularly occupied buildings and the grounds that they occupy- having regard to visual intrusion or the likely effect of noise generation and, in the case of wind energy proposals, ice throw in winter conditions, shadow flicker or shadow throw;*
- *ground water, surface water (including water supply), aquatic ecosystems and fisheries;*
- *the safe use of airport, defence or emergency service operations, including flight activity, navigation and surveillance systems and associated infrastructure, or on aircraft flight paths or MoD low-flying areas;*

- *other communications installations or the quality of radio or TV reception;*
- *the amenity of users of any Core Path or other established public access for walking, cycling or horse riding;*
- *tourism and recreation interests; and*
- *land and water based traffic and transport interests.*

Proposals for the extension of existing renewable energy facilities will be assessed against the same criteria and material considerations as apply to proposals for new facilities.

In all cases, if consent is granted, the Council will approve appropriate conditions (along with a legal agreement/obligation under section 75 of the Town and Country Planning (Scotland) Act 1997, as amended, where necessary), relating to the removal of the development and associated equipment and to the restoration of the site, whenever the consent expires, other than in circumstances where fresh consent has been secured to extend the life of the project, or the project ceases to operate for a specific period.

The Onshore Wind Energy Supplementary Guidance will replace parts of the Highland Renewable Energy Strategy. It will identify: areas to be afforded protection from wind farms; other areas with constraints; and broad areas of search for wind farms. It will set out criteria for the consideration of proposals. It will ensure that developers are aware of the key constraints to such development and encourage them to take those constraints into account at the outset of the preparation of proposals. It will seek to steer proposals, especially those for larger wind farms, away from the most constrained areas and ideally towards the least constrained areas and areas of particular opportunity. It will also set out criteria which will apply to the consideration of proposals irrespective of size and where they are located, enabling proposals to be considered on their merits. It will seek submission as part of the planning application of key information required for the assessment of proposals and provide certainty for all concerned about how applications will be considered by the Council."

2.117 Policy 67 is a multi-criteria based policy which provides general support for wind energy proposals provided they will not be significantly detrimental overall, having regard in particular to any significant effects on the receptors referenced within the policy. This is the policy of most relevance of the HwLDP to the Proposed Wind Farm Development receptors.

General Policies

2.118 This section of the chapter sets out the relevant general development assessment policies, which contain a number of policy criteria spanning a range of policy topics.

2.119 **Policy 28 Sustainable Design** refers to a number of criteria of relevance to the proposed development. The relevant criteria are quoted below.

"The Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland.

Proposed developments will be assessed on the extent to which they:

- *… maximise energy efficiency in terms of location, layout and design, including the utilisation of renewable sources of energy and heat;*
- *are affected by physical constraints described in Physical Constraints on Development: Supplementary Guidance*
- *… demonstrate that they have sought to minimise the generation of waste during the construction and operational phases. (This can be submitted through a Site Waste Management Plan);*
- *impact on individual and community residential amenity;*
- *impact on non-renewable resources such as mineral deposits of potential commercial value, prime quality agricultural land, or approved routes for road and rail links;*
- *impact on the following resources, including pollution and discharges, particularly within designated areas:*
  - *habitats* *freshwater systems*
  - *species* *marine systems*
  - *landscape* *cultural heritage*
  - *scenery* *air quality;*
- *demonstrate sensitive siting and high quality design in keeping with local character and historic and natural environment and in making use of appropriate materials; and*
- *… contribute to the economic and social development of the community.*

Developments which are judged to be significantly detrimental in terms of the above criteria will not accord with this Local Development Plan. All development proposals must demonstrate compatibility with the Sustainable Design Guide: Supplementary Guidance, which requires that all developments should:

- *conserve and enhance the character of the Highland area;*
- *use resources efficiently;*
- *minimise the environmental impact of development; and*
- *enhance the viability of Highland communities.*

Compatibility should be demonstrated through the submission of a Sustainable Design Statement where required to do so by the Guidance.

All developments must comply with the greenhouse gas emissions requirements of the Sustainable Design Guide.

In the relatively rare situation of assessing development proposals where the potential impacts are uncertain, but where there are scientific grounds for believing that severe damage could occur either to the environment or the wellbeing of communities, the Council will apply the precautionary principle.

Where environmental and/or socio-economic impacts of a proposed development are likely to be significant by virtue of nature, size or location, The Council will require the preparation by developers of appropriate impact assessments. Developments that will have significant adverse effects will only be supported if no reasonable alternatives exist, if there is demonstrable over-riding strategic benefit or if satisfactory overall mitigating

measures are incorporated."

2.120 Policy 28 is a multi-criteria based policy which supports THC's sustainability objectives. It provides a range of criteria for proposed developments to be assessed against. The policy indicates that developments which are judged to be significantly detrimental in terms of the criteria shall be considered to be in non-accordance with the Local Development Plan (LDP). It is notable that this policy does not require absolute accordance with all policy criteria. It adds that all development proposals must demonstrate compatibility with the Sustainable Design Guide: Supplementary Guidance.

2.121 Policy 31 Developer Contributions states:

"For development proposals which create a need for new or improved public services, facilities or infrastructure, the Council will seek from the developer a fair and reasonable contribution in cash or kind towards these additional costs or requirements. Such contributions will be proportionate to the scale and nature of the development proposed and may be secured through a Section 75 obligation or other legal agreement as necessary. Other potential adverse impacts of any development proposal will normally be addressed by planning condition but may also require a contribution secured by agreement.

The principles that guide the preparation of the Developer Contributions: Supplementary Guidance are:

- *Fair and proportionate developer contributions for all developments on sites allocated in either the Highland-wide Local Development Plan or one of the area local development plans or in terms of windfall development.*
- *Developer contributions will be sought where a need for new or improved services, facilities or infrastructure has been identified that relates directly to the proposed development.*
- *Flexibility in approach to ensure that development can be brought forward in difficult economic circumstances while ensuring that the development has no net detriment.*
- *Facilitate informed decision making by those involved in the development process, allowing potential financial implications to be factored into development appraisals prior to commercial decisions and actions being undertaken."*

2.122 This general policy identifies the circumstances in which the Council will seek developer contributions and identifies the principles which guide these.

Landscape / Natural Heritage Policy

2.123 In addition to landscape and natural heritage matters being dealt with by Policy 67, as set out above, Policies 58 – 61 also address these matters and are set out below.

2.124 Policy 58 Protected Species states:

"Where there is good reason to believe that a protected species may be present on site or may be affected by a proposed development, we will require a survey to be carried out to establish any such presence and if necessary a mitigation plan to avoid or minimise any impacts on the species, before determining the application.

Development that is likely to have an adverse effect, individually and/or cumulatively, on European Protected Species (see Glossary) will only be permitted where:

- *There is no satisfactory alternative; and*
- *The development is required for preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment; and*
- *The development will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.*

Development that is likely to have an adverse effect, individually and/or cumulatively, on protected bird species (see Glossary) will only be permitted where:

- *There is no other satisfactory solution; and*
- *The development is required in the interests of public health or public safety.*

This will include but is not limited to avoiding adverse effects, individually and/or cumulatively, on the populations of the following priority protected bird species:

- *Species listed in Annex 1 of the EC Birds Directive;*
- *Regularly occurring migratory species listed in Annex II of the Birds Directive;*
- *Species listed in Schedule 1 of the Wildlife and Countryside Act 1981 as amended; and*
- *Birds of conservation concern.*

Development that is likely to have an adverse effect, individually and/or cumulatively (see glossary), on other protected animals and plants (see Glossary) will only be permitted where the development is required for preserving public health or public safety.

Development proposals should avoid adverse disturbance, including cumulatively, to badgers and badger setts, protected under the Protection of Badgers Act 1992 (as amended by the Nature Conservation (Scotland) Act 2004."

2.125 Policy 58 is a multi-criteria based policy which applies to development proposals that may affect protected species, including European protected species.

2.126 Policy 59 Other Important Species states:

"The Council will have regard to the presence of and any adverse effects of development proposals, either individually and/or cumulatively, on the Other Important Species which are included in the lists below, if these are not already protected by other legislation or by nature conservation site designations:

- *species listed in Annexes II and V of the EC Habitats Directive;*
- *priority species listed in the UK and Local Biodiversity Action Plans;*
- *Species included on the Scottish Biodiversity List."*

2.127 Policy 59 identifies that the Council will take into consideration any adverse effects of development proposals on the species identified in the policy.

2.128 Policy 60 Other Important Habitats and Article 10 Features states:

"The Council will seek to safeguard the integrity of features of the landscape which are of

major importance because of their linear and continuous structure or combination as habitat "stepping stones" for the movement of wild fauna and flora (Article 10 Features). The Council will also seek to create new habitats which are supportive of this concept. The Council will have regard to the value of the following Other Important Habitats, where not protected by nature conservation site designations (such as natural water courses), in the assessment of any development proposals which may affect them either individually and/or cumulatively:

- *habitats listed in Annex I of the EC Habitats Directive;*
- *habitats of priority and protected bird species (see Glossary);*
- *priority habitats listed in the UK and Local Biodiversity Action Plans; and*
- *habitats included on the Scottish Biodiversity List.*

The Council will use conditions and agreements to ensure that significant harm to the ecological function and integrity of Article 10 Features and Other Important Habitats is avoided. Where it is judged that the reasons in favour of a development clearly outweigh the desirability of retaining those important habitats, the Council will seek to put in place satisfactory mitigation measures, including where appropriate consideration of compensatory habitat creation."

2.129 Policy 60 relates to the protection of important habitats from the effects of development.

2.130 Policy 61 Landscape states:

"New developments should be designed to reflect the landscape characteristics and special qualities identified in the Landscape Character Assessment of the area in which they are proposed. This will include consideration of the appropriate scale, form, pattern and construction materials, as well as the potential cumulative effect of developments where this may be an issue. The Council would wish to encourage those undertaking development to include measures to enhance the landscape characteristics of the area. This will apply particularly where the condition of the landscape characteristics has deteriorated to such an extent that there has been a loss of landscape quality or distinctive sense of place. In the assessment of new developments, the Council will take account of Landscape Character Assessments, Landscape Capacity Studies and its supplementary guidance on Siting and Design and Sustainable Design, together with any other relevant design guidance.

Note: The principles and justification underpinning the Council's approach to sustainable developments are contained in the supplementary guidance: "Sustainable Design". The key principles underlying this guidance are set out in Policy 28: Sustainable Design."

2.131 Policy 61 promotes the preservation and enhancement of landscape characteristics and qualities by development proposals.

Cultural and Built Heritage Policy

2.132 In addition to cultural and built heritage matters being dealt with by Policy 67, as set out above, Policy 57 also addresses these matters.

2.133 Policy 57 Natural, Built and Cultural Heritage states:

"All development proposals will be assessed taking into account the level of importance and type of heritage features, the form and scale of the development, and any impact on the feature and its setting, in the context of the policy framework detailed in Appendix 2. The following criteria will also apply:

1. For features of local/regional importance we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource.

2. For features of national importance we will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource. Where there may be any significant adverse effects, these must be clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services.

3. For features of international importance developments likely to have a significant effect on a site, either alone or in combination with other plans or projects, and which are not directly connected with or necessary to the management of the site for nature conservation will be subject to an appropriate assessment. Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, we will only allow development if there is no alternative solution and there are imperative reasons of overriding public interest, including those of a social or economic nature. Where a priority habitat or species (as defined in Annex 1 of the Habitats Directive) would be affected, development in such circumstances will only be allowed if the reasons for overriding public interest relate to human health, public safety, beneficial consequences of primary importance for the environment, or other reasons subject to the opinion of the European Commission (via Scottish Ministers). Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, the proposal will not be in accordance with the development plan within the meaning of Section 25(1) of the Town and Country Planning (Scotland) Act 1997.

Note: Whilst Appendix 2 groups features under the headings international, national and local/regional importance, this does not suggest that the relevant policy framework will be any less rigorously applied. This policy should also be read in conjunction with the Proposal map.

The Council intends to adopt the Supplementary Guidance on Wild Areas in due course. The main principles of this guidance will be:

- *to provide mapping of wild areas;*
- *to give advice on how best to accommodate change within wild areas whilst safeguarding their qualities;*
- *to give advice on what an unacceptable impact is; and*
- *to give guidance on how wild areas could be adversely affected by development close to but not within the wild area itself.*

In due course the Council also intends to adopt the Supplementary Guidance on the Highland

Historic Environment Strategy. The main principles of this guidance will ensure that:

- *Future developments take account of the historic environment and that they are of a design and quality to enhance the historic environment bringing both economic and social benefits.*
- *It sets a proactive, consistent approach to the protection of the historic environment."*

2.134 Policy 57 is a multi-criteria based policy which seeks to ensure that natural, built and cultural heritage resources are safeguarded. Different policy tests apply to resources of local/regional, national and international importance.

Other Policy

2.135 Policy 53 Minerals states:

"The Council will support the following areas for mineral extraction:

- *Extension of an existing operation/site;*
- *Re-opening of a dormant quarry; and*
- *A reserve underlying a proposed development where it would be desirable to extract prior to development.*

Before a new site for minerals development will be given permission, it must be shown that other existing reserves have been exhausted or are no longer viable or, for construction aggregates, amount to less than a ten-year supply of permitted reserves.

The Council will support borrow pits which are near to or on the site of the associated development if it can be demonstrated that they are the most suitable source of material, are time limited and appropriate environmental safeguards are in place for the workings and the reclamation.

Geodiversity will also be considered when assessing proposals; the Council may set out conditions covering working methods, restoration and after use to safeguard the geodiversity value. Geodiversity value may occur outwith designated sites. The Council will encourage opportunities to enhance geodiversity in all relevant development proposals including the potential to create, extend or restore geodiversity interests e.g. during mineral working and restoration.

The Council will safeguard all existing economically significant, workable minerals reserves/operations from incompatible development which is likely to sterilise it unless:

- *there is no alternative site for the development; and*
- *the extraction of mineral resources will be completed before the development commences.*

All minerals developments will have to provide information on pollution prevention, restoration and mitigation proposals. Restoration should be carried out in parallel with excavation where possible. Otherwise it should be completed in the shortest time practicable. Planning conditions will be applied to ensure that adequate provision is made for the restoration of workings. The Council will expect all minerals developments to avoid or satisfactorily mitigate any impacts on residential amenity, the natural, built and cultural heritage, and infrastructure capacities. After uses should result in environmental improvement rather than just restoring a site to its original state. After uses should add to the cultural, recreational or environmental assets of an area. A financial guarantee may be sought."

2.136 Policy 53 concerns mineral extraction and has limited relevance to the development of wind farms, with the exception of the third paragraph which provides support for borrow pits where they are located near to or on the site of the associated development. This is on the basis that it can be demonstrated that they are the most suitable source of material, are time limited and appropriate environmental safeguards are in place for the workings and the reclamation of the materials.

2.137 Policy 55 Peat and Soils states:

"Development proposals should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils.

Unacceptable disturbance of peat will not be permitted unless it is shown that the adverse effects of such disturbance are clearly outweighed by social, environmental or economic benefits arising from the development proposal.

Where development on peat is clearly demonstrated to be unavoidable then The Council may ask for a peatland management plan to be submitted which clearly demonstrates how impacts have been minimised and mitigated.

New areas of commercial peat extraction will not be supported unless it can be shown that it is an area of degraded peatland which is clearly demonstrated to have been significantly damaged by human activity and has low conservation value and as a result restoration is not possible.

Proposals must also demonstrate to the Council's satisfaction that extraction would not adversely affect the integrity of nearby Natura sites containing areas of peatland."

Policy 55 requires that development proposals demonstrate how they avoid unnecessary disturbance, degradation or erosion of peat and soils.

2.138 Policy 64 Flood Risk

"Development proposals should avoid areas susceptible to flooding and promote sustainable flood management.

Development proposals within or bordering medium to high flood risk areas, will need to demonstrate compliance with Scottish Planning Policy through the submission of suitable information which may take the form of a Flood Risk Assessment.

Development proposals outwith indicative medium to high flood risk areas may be acceptable. However, where:

- *better local flood risk information is available and suggests a higher risk;*
- *a sensitive land use (as specified in the risk framework of Scottish Planning Policy) is proposed, and/or*
- *the development borders the coast and therefore may be at risk from climate change;*

A Flood Risk Assessment or other suitable information which demonstrates compliance with SPP will be required.

Developments may also be possible where they are in accord with the flood prevention or management measures as specified within a local (development) plan allocation or a development brief. Any developments, particularly those on the flood plain, should not compromise the objectives of the EU Water Framework Directive.

Where flood management measures are required, natural methods such as restoration of floodplains, wetlands and water bodies should be incorporated, or adequate justification should be provided as to why they are impracticable."

2.139 Policy 64 provides general flood risk guidance for development proposals and identifies the areas in which development proposals will be required to comply with Scottish Planning Policy (SPP) through the submission of a flood Risk Assessment and also identifies the other areas in which a Flood Risk Assessment may be required.

The Moray Development Plan

2.140 As referenced above Policy 2 'Environment and Resources' of the Moray Structure Plan and Policy ER1 'Renewable Energy Proposals' of the Moray Local Plan deal with renewable energy development and have some relevance to the Proposed Wind Farm Development. These policies are set out below.

2.141 Structure Plan Policy 2 'Environment and Resources' is a multi-criteria policy that is relevant to the protection and development of the environment and the natural resources located within Moray. Policy criterion (l) is of relevance, which supports the sensitive development of renewable energy development within Moray.

2.142 **Local Plan Policy ER1 'Renewable Energy Proposals'** is relevant to the assessment of all renewable energy development proposals within Moray. The policy states:

"Renewable energy proposals will be considered favourably where they meet the following criteria:

- *a. they are compatible with policies to safeguard and enhance the built and natural environment*
- *b. they do not lead to the permanent loss or permanent damage to, prime agricultural land,*
- *c. they are compatible with tourism/recreational interest and facilities, they do not interfere with aircraft activity,*
- *d. they do not result in an unacceptable impact in terms of visual appearance, landscape character, noise, electro-magnetic disturbance, watercourse engineering, peat land hydrological impacts, pollution, traffic generation or damage to the local ecology, and*
- e. they do not result in an unacceptable cumulative impact.

Proposals are required to provide "decommissioning arrangements" to illustrate how the site will be reinstated if and when the plant ceases to operate. This may be enforced through a section 75 agreement. Commercial wind energy developments should be located within a Preferred Search area identified in the Wind Energy Policy Guidance and meet the above criteria."

2.143 In addition, the following Moray Council Development Plan policies have also been taken into account through the EIA:

- Structure Plan Policy 2 - Environment and Resources;
- Local Plan Policy E1 – Natura 2000 Sites and Nature Conservation Sites;
- Local Plan Policy E2 – Local Nature Conservation Designation and Biodiversity;
- Local Plan Policy E6 – National Parks and National Scenic Areas;
- Local Plan Policy E7 – Areas of Great Landscape Value;
- Local Plan Policy VE2 – Listed Buildings Consultation Responses;
- Local Plan Policy BE4 – Gardens and Designed Landscapes;
- Local Plan Policy EP4 – Private Water Supply;
- Local Plan Policy EP5 – Service Water Drainage Sustainable Urban Drainage Systems;
- Local Plan Policy EP6 – Water Bodies;
- Local Plan Policy EP8 – Pollution;
- Local Plan Policy EP9 – Contaminated Land;
- Local Plan Policy ER1 – Renewable Energy Proposals; and
- Local Plan Policy IMP 1 – Development Requirements.

The Cairngorms National Park Development Plan

2.144 Due to the proximity of the Proposed Wind Farm Development to the CNP, aspects of the CNP Development Plan also have some relevance to the EIA, particularly the Cairngorms National Park Local Plan 2010. The Local Plan policies considered through the EIA are as follows:

- Policy 6: Landscape; and
- Policy 15: Renewable Energy Generation.

National Planning Policy

2.145 National planning policy is mostly provided within the National Planning Framework 2 (NPF2) and Scottish Planning Policy (SPP).

2.146 The Scottish Government also provide Planning Advice Notes (PANs) that provide advice on good practice and information on technical planning matters. For renewable energy development, the Scottish Government also provides web-based renewables guidance, providing advice on technical matters relating to renewable energy development proposals.

The National Planning Framework 2

2.147 NPF 2 was issued in its final form on 25 June 2009. NPF 2 guides Scotland's development to 2030 and sets out strategic development priorities to support the Scottish Government's central purpose - sustainable economic growth.

2.148 NPF 2 addresses major planning and development challenges including climate change. It contains targets for energy supply and the reduction of greenhouse gas emissions (Para 3). It takes forward the spatial aspects of the Scottish Government's policy commitments on sustainable economic growth and climate change, which Para 5 of the document notes "*will see Scotland move towards a low carbon economy".*

2.149 The NPF2 refers to sustainable development (page 6) and notes that "*The Scottish Government's commitment to sustainable development is reflected in its policies on matters such as climate change, transport, renewable energy….*"

2.150 Climate change is specifically referred to in paragraph 16 *et seq.* and it notes that substantial reductions in greenhouse gas emissions will be necessary to minimise the impact of climate change. Paragraph 19 notes that the UK and Scottish Governments are taking an international lead by introducing ambitious statutory emission reduction targets through, respectively, the UK Climate Change Act and the Scottish Climate Change Bill (now enacted).

2.151 Energy is specifically referred to at paragraph 25 in NPF 2. It notes that:

2.152 "*tackling climate change and reducing dependence on finite fossil fuels are two of the major global challenges of our time ….. addressing these challenges will demand profound changes in the way we produce distribute and use energy over the coming decades.*"

2.153 Paragraph 26 notes that the EU has now set a commitment to derive 20% of its energy use from renewable sources by 2020. Reference is also made to the Scottish Government support for this objective and Scotland's own, higher target for electricity generated from renewable sources, which is now 80% by 2020.

2.154 NPF 2 also refers to a development strategy at paragraph 53 and notes that the main elements of the spatial strategy to 2030 are to *inter alia*:

"realise the potential of Scotland's renewable energy resources and facilitate the generation of power and heat from all clean, low carbon sources".

2.155 In terms of sustainable growth, paragraph 65 notes that energy is a major resource for rural areas and it states that "*the Government is committed to realising the power generating potential of renewable sources of energy".*

2.156 It should also be noted that paragraph 145 in NPF 2, with regard to energy, notes that the Government is committed to establishing Scotland as a leading location for the development of renewable energy technology and an energy exporter over the long term. It notes that "*the aim of national planning policy is to develop Scotland's renewable energy potential while safeguarding the environment and communities"*.

2.157 Overall therefore, the NPF 2 sets out the Government's commitment to the further development of renewable energy in Scotland and confirms the importance of this resource as a key element of achieving the spatial strategy for the country up to 2030 and indeed, as a key element to attaining the Government's central purpose of increasing sustainable economic growth.

Scottish Planning Policy (SPP)

2.158 On the 4 February 2010, the Scottish Ministers issued 'Scottish Planning Policy' (SPP). The SPP identifies that the Scottish Government's planning policy is now provided within the NPF, Designing Places, Designing Streets, Circulars, Scottish Historic Environment Policy (SHEP) and the SPP. The SPP sets out:

- The Scottish Government's view of the purpose of planning;
- The 'core principles' for the operation of the system and the objectives for the key parts of the system;
- Statutory guidance on sustainable development and planning under Section 3E of the Planning etc. (Scotland) Act 2006;
- Concise subject planning policies, including the implications for development planning and development management; and
- The Scottish Government's expectations of the intended outcomes of the planning system.

2.159 The SPP provides an overview of the purpose of the planning system and states that the Scottish Government's view is that "*a properly functioning planning system is essential to achieving its central purpose of increasing sustainable economic growth"* (paragraph 4).

2.160 The Scottish Government advocates that the planning system should be structured and operated with the purpose of increasing sustainable economic growth and to support the Scottish Government's five strategic objectives and fifteen national outcomes.

2.161 The SPP also recognises that whilst the planning system should be genuinely "*plan-led*". It states the system:

"has a critical balancing role to play when competing interests emerge in the consideration of future development. It is essential to recognise that planning issues, by their very nature, will often bring differing interests into opposition and disagreement and the resolution of those issues will inevitably disappoint some parties" (paragraph 6).

2.162 Development Management policy advice is set out at paragraph 22 *et seq.* of the SPP. It is stated that Development Management is a key part of the planning system and:

"should operate in support of the Government's central purpose of increasing sustainable economic growth. This means providing greater certainty and speed of decision making…"

2.163 The SPP notes that increasing sustainable economic growth and sustainable development is an overarching principle of the Scottish Government and that the:

"planning system should promote development that supports the move towards a more economically, socially and environmentally sustainable society".

2.164 Paragraph 37 states that the decision making process within the planning system should:

"contribute to the reduction of greenhouse gas emissions in line with the commitment to reduce emissions by 42% by 2020 and 80% by 2050, contribute to reducing energy consumption and to the development of renewable energy generation opportunities."

2.165 Climate Change, and the need to reduce greenhouse gas emissions, is prominent within the

SPP and reaffirms the position of Section 44 of the Climate Change (Scotland) Act 2009 which places a statutory duty on all public bodies to act:

- in the way best calculated to contribute to the delivery of the emissions targets in the Act;
- in the best way calculated to help deliver the Government's climate change adaptation programme; and
- in a way that it considers is most sustainable.

2.166 The 2020 and 2050 greenhouse gas reduction targets are noted and it is stated at paragraph 42 of the SPP that:

"the causes of climate change and the need to adapt to its short and long terms impacts should be taken into account in all decisions throughout the planning system".

2.167 In addition to the policy advice summarised above, the SPP provides more detailed planning policy advice with regard to specific subject areas, which has replaced the previous series of SPPs and NPPGs. A summary of the specific policy advice within SPP relevant to the proposed development is provided in Table 6.1 below.

Table 2.1 Summary of SPP Subject Policies

Subject Policy	Summary
Renewable Energy	Sets out the Government's policy in relation to renewable energy addressed by local authorities in Development Plan policies and Development Management decisions.
Economic Development	Highlights the emphasis on business development contributing to economic prosperity. Development Plans should provide positive support for a range of economic development opportunities and must respond to market forces and the pace of economic change.
Historic Environment	Provides guidance on the role of the planning system with respect to the preservation of the historic environment.
Landscape and Natural Heritage	Sets out national planning policy considerations in relation to Scotland's natural heritage and summarises the main statutory obligations in relation to the conservation of natural heritage. The guidance describes the role of the planning system in safeguarding sites of national and international importance, and draws attention to the importance of the safeguarding and enhancing the natural heritage beyond the confines of designated areas.
Rural Development	Provides guidance to local authorities on developments located in a rural setting. The policy highlights that there should be greater scope for more innovative planning polices for rural development.
Transport	Promotes an integrated approach to land use planning, economic development, transport and the environment. Seeks to ensure that developments likely to affect trunk and other strategic roads should be managed so as not to adversely impact on the safe and efficient flow of traffic. Includes guidance on planning for different transport modes, the use of transport assessment methodology and travel plans.

Renewable Energy

2.168 The SPP outlines the Scottish Government's commitment to increase the amount of electricity generated from renewable sources to meet statutory obligations and states that: "*the commitment to increase the amount of electricity generated from renewable sources is a vital part of the response to climate change*" (paragraph 182).

2.169 Scotland's 2020 target for 50% [now 100%] of electricity to be generated from renewable sources is referred to and it is stated that this targets is not a cap. The SPP states that Planning Authorities should *"support the development of a diverse range of renewable energy technologies, guide development to appropriate locations*..." (paragraph 184). It is also stated that onshore wind farms will continue to be the main source of renewable energy.

2.170 The SPP states that Planning Authorities should support the development of wind farms:

2.171 "*in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed*" (paragraph 187).

2.172 The SPP sets out the criteria that should be considered in deciding applications for all wind farm developments and requires that Development Plans or Supplementary Planning Guidance (SPG) set out those matters clearly at the local level. The SPP advises that the assessment criteria are likely to include:

- landscape and visual impact;
- effects on the natural heritage and historic environment;
- contribution of the development to renewable energy generation targets;
- effect on the local and national economy and tourism and recreational interests;
- benefits and disbenefits for communities;
- aviation and telecommunications;
- noise and shadow flicker; and
- cumulative impact.

2.173 The SPP also requires Planning Authorities to set out, within Development Plans, a spatial framework for wind farms of over 20MW and a spatial framework for wind farms under 20MW if considered appropriate. It is advised that "*Spatial frameworks should not be used to put in place a sequential approach to determining applications which requires applicants proposing developments out with an area of search to show that there is no capacity within areas of search*" (paragraph 189). It is also stated that with regard to the development constraints that require to be considered in developing a spatial framework "*that the existence of these constraints does not impose a blanket restriction on development*" (paragraph 190).

Historic Environment

2.174 The SPP sets out the Scottish Government's policy on the protection, conservation and enhancement of the historic environment and the role of the planning system.

2.175 The SPP states that the historic environment includes ancient monuments, archaeological

sites and landscapes, historic buildings, townscapes, parks, gardens and designed landscapes and other features. Non-designated sites, as well as designated sites, are considered by the SPP as an important element of Scotland's heritage which contribute to national identity.

2.176 Paragraph 111 notes that "*In most cases, the historic environment (excluding archaeology) can accommodate change which is informed and sensitively managed, and can be adapted to accommodate new uses whilst retaining its special character*".

2.177 The SPP makes reference to the need to take into account Historic Scotland policy in the determination of applications affecting the historic environment; which includes SHEP and the 'Managing Change in the Historic Environment' guidance note series.

Landscape and Natural Heritage

2.178 The SPP provides policy guidance for the conservation, enhancement and sustainable use of Scotland's landscape and natural heritage. At paragraph 125 *et seq.* natural heritage is identified as including flora, fauna, geological and physiographical features, its natural beauty and amenity (Natural Heritage (Scotland) Act 1991).

2.179 Planning Authorities are directed to take a broader approach to landscape and natural heritage than just conserving designated sites and species. The SPP also states that the *"Landscape in both the countryside and urban areas is constantly changing and the aim is to facilitate positive change whilst maintaining and enhancing distinctive character*." It is also stated that "*Different landscapes will have a different capacity to accommodate new development, and the siting and design of development should be informed by the local landscape character*" (paragraph 127).

2.180 Paragraph 131 of the SPP states that "*While the protection of the landscape and natural heritage may sometimes impose constraints on development, with careful planning and design the potential for conflict can be minimised and the potential for enhancement maximised*".

2.181 On designated sites, the SPP provides guidance that "*Statutory natural heritage designations are important considerations where they are directly or indirectly affected by a development proposal. However, designation does not necessarily imply a prohibition on development*" (paragraph 131).

2.182 The SPP states that Planning Authorities should only apply the precautionary principle where the impacts of a proposed development are uncertain and where there is *"sound evidence*" that irreversible damage could occur. In line with this, paragraph 132 is clear in that "*The precautionary principle should not be used to impede development unnecessarily. Where development is constrained on the grounds of uncertainty, the potential for research, surveys or assessments to remove or reduce uncertainty should be considered*".

2.183 The SPP provides detailed guidance on natural heritage resources and classifies those under five key headings, namely:

- International Designations;
- National Designations;
- Local designations;
- Protected Species; and
- Trees and Woodland.

2.184 Sites with international designations, such as Natura 2000 sites, must be subject to appropriate assessment by Planning Authorities on its conservation objectives where developments are likely to result in significant adverse effects on the designation. Development which could have a significant effect on a Natura site will only be permitted where:

- an appropriate assessment has demonstrated that it will not adversely affect the integrity of the site; or
- there are no alternative solutions; and
- there are imperative reasons of overriding public interest, including those of a social or economic nature.

2.185 Nationally designated sites, such as NSAs, SSSIs, National Parks and NNRs are noted as important planning considerations in the assessment of applications, and development proposals should only be permitted where:

- it will not adversely affect the integrity of the area or the qualities for which it has been designated; or
- any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.

2.186 International and national natural heritage designations can be complemented by local designations which "*seek to protect, enhance and encourage the enjoyment and understanding of locally important landscapes and natural heritage*" (paragraph 139). Local designations can be both statutory and non-statutory. Local Nature Reserves are statutory designations and for non-statutory designations, the SPP seeks to limit local designations to two types; namely, Local Landscape Areas and Local Nature Conservation Sites.

2.187 Although local designations should be taken into account in the assessment of development proposals, paragraph 139 of the SPP states that "*The level of protection given to local designations through the development plan should not be as high as the level of protection given to international or national designations*".

2.188 Paragraph 142 provides guidance on protected species and notes that the presence of legally protected species is an important material consideration in the assessment of planning applications. Although the presence of protected species rarely imposes an absolute block on development, a Planning Authority has to be clear that suitable mitigation measures have been adopted. Where a proposed development is likely to have an adverse effect on European Protected Species, planning permission cannot be granted unless the Authority can be satisfied that:

- there is no satisfactory alternative; and
- the development is required for preserving public health or public safety or for other

imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance to the environment.[5]

Rural Development

2.189 The SPP provides the Scottish Government's planning guidance on rural development at paragraphs 92-96. Significant emphasis is placed on supporting sustainable economic growth within rural areas and it is identified that the planning system has a large role to play in achieving this. It is recommended that the Development Plan should reflect the "*overarching aim of supporting diversification and growth in the rural economy*" (paragraph 93).

2.190 Good quality design and high environmental standards are required for rural development and paragraph 95 states that "*All new development should respond to the specific local character of the location, fit in with the landscape and seek to achieve high design and environmental standards, particularly in relation to energy efficiency*".

2.191 The SPP also seeks to provide protection to 'prime quality agricultural land' from inappropriate developments, but with regard to renewable energy developments notes that "*Renewable energy generation or minerals extraction may be acceptable where restoration proposals will return the land to its former status*" (paragraph 97).

Transport

2.192 Reducing emissions from transportation sources is identified as providing a contribution to the Scottish Government's greenhouse gas reduction targets. Tackling emission levels and congestion will support economic growth and Planning Authorities are required to give consideration to the relationship between transport and land use in order to achieve sustainable patterns of development.

2.193 Paragraph 167 notes that Planning Authorities should take into account existing transport, environmental and operational constraints, proposed or committed transport projects and demand management schemes, and that "*development should be supported in locations that are accessible by walking, cycling and public transport, making best use of or adding to existing network and creating new networks".*

2.194 Development proposals that have a potential to affect the strategic transport network should be appraised to determine their effects and the SPP requires Planning Authorities to consult Transport Scotland on the proposal, including any potential mitigation.

Planning Advice Notes (PANs)

2.195 Table 6.2 below identifies and summarises PANs[6] of particular relevance to the Proposed Wind Farm Development.

Table 2.2 Planning Advice Notes

Guidance	Title	Summary
PAN 2/2011	Archaeology the Planning Process and Scheduled Ancient Monument Procedures (1994)	Provides best practice advice on addressing archaeological issues within the planning process, and on best practice separate controls over scheduled monuments.
Scottish Government Web Based Renewables Guidance (Replacement for PAN 45 including Annex 2)	Web Based Renewables Advice – Website Notes	Advises on aspects of 'Onshore Wind Turbines' and on the 'Process for preparing spatial frameworks for wind farms'.
PAN 1/2011	Planning and Noise	Sets out the role of the planning system in preventing and limiting the adverse effects of noise.
PAN 60	Planning for Natural Heritage (2000)	Gives basic advice in relation to development and natural heritage. It reiterates the Government's Commitment to the protection and enhancement of the natural heritage.
PAN 75	Planning for Transport (2005)	Provides advice on the requirement to link transport strategies and development plans and the need to take into account accessibility, location, modal split parking and design.
PAN 3/2010	Community Engagement – Planning with People (2007)	Advice to Planning Authorities and developers on how communities should be properly engaged in the planning process.

Scottish Government Web Based Renewables Guidance (Replacement of PAN 45: Revised October 2012)

2.196 PAN 45 'Renewable Energy Technologies' (including the Annex 2 document) was replaced in February 2011 by web based Renewables guidance[7], which the Scottish Government's website notes will be regularly updated. The first tranche of the guidance includes aspects regarding 'Onshore wind turbines' and the 'Process for preparing Spatial Frameworks for Wind farms'. Key points from the guidance is summarised below.

2.197 The guidance on Onshore Wind Turbines highlights that when Planning Authorities are preparing their 'evidence base' and planning policy, that they should consider if their spatial frameworks and polices are consistent with SPP and "*determine if they proactively respond to the Renewable Energy Action Plan and current national targets for electricity from renewable sources".*

2.198 The guidance provides advice on the typical planning considerations that will arise in determining planning applications for onshore wind farms. In addition the guidance also provides technical information for onshore wind farms with respect to a number of

[5] The SPP must be read in light of the recent decision of the Supreme Court in Morge v Hampshire County Council [2011] UKSC 2.

[6] The Scottish Government, Planning Advice Note Series

[7] The Scottish Government, Web Based Renewables Guidance (2011), http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables

development matters such as turbine type, turbine power, turbine foundations, connection to the electricity network, power lines, access, wind speed etc. Policies have also to provide "*clear guidance for applicants*" and should be consistent with the key principle of renewable energy siting as per SPP.

Landscape Impacts

2.199 The guidance notes that wind turbines can impact upon the landscape due to their number, size and layout and that the ability of the landscape to absorb development often depends on landscape character features such as landform, ridges, hills, valleys and vegetation. It is noted that different turbine layouts may be more or less suited to particular landscape types and matters such as access, landform change, surfacing and vegetation can also influence to what extent development proposals integrate with the landscape.

2.200 It is also advised that where particular landscapes are rare or valued, such as National Scenic Areas, a cautious approach is required when considering wind farm applications. The guidance notes that SNH is the Scottish Government's national agency and their statutory advisor on landscape matters. The guidance expects SNH's guidance to be followed with respect to landscape character appraisal and landscape and visual impact analysis, as well as wind farm design. Importantly the guidance notes that any supplementary information required to deliver local solutions must not conflict with national standards and must be proportionate and reasonable.

Impacts on Wildlife and Habitat, Ecosystems and Biodiversity

2.201 The guidance notes that wind farm development has the potential to affect biodiversity both positively and negatively. Positive benefits include wider climate change and the opportunities to deliver benefits through improved land management, land restoration and habitat creation. Adverse impacts are also noted as being possible due to loss or damage to vulnerable habitats, collision risk with turbine blades, displacement and disturbance.

2.202 It is advised that wind farms should not adversely affect the integrity of designated sites protected under EU and UK legislation, such as SPAs, SACs and SSSIs, or the other wider conservation interests outlined in SPP.

Assessing Impact on Wildlife and Habitat

2.203 The guidance notes that many birds and their habitats are largely unaffected by wind farm development, although collision risk, displacement and disturbance risks need to be quantified.

Buffer Zones

2.204 The guidance advises that buffer zones should not be established around areas designated for natural heritage reasons.

Impact on Communities

2.205 The guidance advises that there are a number of potential impacts on communities that should be considered, which include shadow flicker, noise, electromagnetic interference to communication systems and ice throw.

2.206 With regard to shadow flicker it is advised, as a rule of thumb, that wind farm development proposals, which are more than 10 rotor diameters from a residential property, should not generally result in adverse effects.

2.207 In terms of noise, the guidance also advises that the ETSU-R-97 methodology:

"should be followed by applicants and consultees, and used by planning authorities to assess and rate noise from wind energy developments, until such time as an update is available".

2.208 It adds that Circular 10/1999 (now superseded) sets out the Government's policy and the role of the planning system in controlling noise. The guidance also refers to low frequency noise and infrasound and in this regard states:

"The most conclusive summary of the implications of low frequency wind farm noise for planning policy is given by the UK Government's statement regarding the findings of the Salford University report into Aerodynamic Modulation of Wind Turbine Noise. The report concludes that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines".

2.209 In terms of the matter of ice throw it is advised that this is unlikely to be a problem with wind farm development due to wind turbines having vibration sensors which are likely to detect such imbalances and inhibit the operation of the wind turbines.

Separation Distances

2.210 The guidance refers to paragraph 190 of SPP, which refers to a 2 km separation distance between areas of search for groups of wind turbines on the edges of towns, cities and villages to reduce visual impact. The guidance specifically states, however, that this 2 km separation distance is a guide, not a rule, and that decisions on individual developments should take into account specific circumstances and geography.

Aviation Matters

2.211 The guidance states that planning authorities should take into account the fact that wind turbines can have implications for aircraft flight paths that they inform the Civil Aviation Authority regarding consented wind farms, and that planning authorities consult the Ministry of Defence (MOD) and NERL/NATS on wind farm applications. In addition, the guidance identifies that MOD flight paths are more irregular than civilian flight paths and as such the MOD should be consulted on wind farm applications. It is identified that the MOD is a statutory consultee in a number of circumstances and that the MOD may request lighting of turbines when it deems it necessary for military aviation purposes.

Road Traffic Impacts

2.212 Guidance states that it may be advisable to set turbines back from roads and railways of at least the height of the turbine to ensure safety.

Cumulative Impacts

2.213 The guidance states that in considering cumulative impact, particularly with regard to

landscape and visual, the scale and pattern of the turbines plus the tracks, power lines and ancillary developments will be relevant considerations, as will the sensitivity and visibility of the landscape and visual receptors. The guidance refers to 'A Guide to Assessing the Cumulative Effects of Wind Energy Development' (ETSU 2000) and the SNH guidance 'Cumulative Effects of Wind Farms' (2005) as relevant guidance to inform the assessment of cumulative impacts.

Decommissioning

2.214 The guidance advises that planning authorities should ensure, either via conditions or legal agreement, that site restoration takes place on expiry of the consent or the expiry of the specified period.

SpatialFrameworks

2.215 The guidance also offers advice to Planning Authorities on the production of spatial frameworks for wind farms over 20 MW. The advice predominantly reflects the policy advice within SPP, but also notes that where Planning Authorities have already developed spatial guidance, the focus should now be on developing guidance for wind farms under 20 MW.

2.216 In terms of cumulative effects, the guidance states that "*Broad Areas of Search should be planned with the existing pattern of development with the intention of encouraging clusters of wind farms…*"

2.217 The guidance highlights that areas designated as 'Areas with Potential Constraints', "*does not equate to a blanket restriction on development*". Emphasis is placed on the need for criteria based polices. It is stated that with the right design approach, developments could be located *"within the historic environment or within an area designated for landscape value".*

Scottish Historic Environment Policy

2.218 The Scottish Historic Environment Policy (SHEP), issued in October 2008, set out the Scottish Ministers' policies for the historic environment.

2.219 However, a revised SHEP was launched by The Scottish Ministers on 27 July 2009, superseding the edition published at the Planning Summit in October 2008. Annex 9 (Page 79) of the new SHEP lists all the changes made to the 2008 edition. The two significant additions are a new chapter superseding the existing UK policy which sets out revised responsibilities of Government bodies for the care of the historic environment in their ownership. Secondly, the Ministers have published their policy on historic battlefields.

2.220 The introductory section to the SHEP explains in Paragraph 1.8 that the protection of the historic environment is not about preventing change. Paragraph 1.9 states that the historic environment faces many challenges, including *"the needs of renewable energy generation".* Recognition of processes such as climate change is referred to in Paragraph 1.5.

2.221 The key principles of the SHEP include policy on the need to ensure that "*where change is proposed, it is appropriate, carefully considered, authoritatively based, properly planned and executed, and (if appropriate) reversible*".

2.222 The theme that emerges from the SHEP is that a balance is to be struck between conservation, promotion and accessibility of historic resources, change and development and community involvement. These matters are given much greater prominence than they were in earlier guidance.

2.223 In addition, in July 2009 Circular 9/2009 was issued and is entitled 'Withdrawal and Replacement of the Memorandum of Guidance on Listed Buildings and Conservation Areas'. The Circular confirms that the policy elements of the Memorandum have now been superseded by the development of the SHEP as referred to above. Furthermore, the detailed guidance provided by the various Annexes to the Memorandum is superseded by Historic Scotland's 'Managing Change in the Historic Environment' Guidance.

SPG: The Highland Renewable Energy Strategy & Planning Guidelines

2.224 THC approved the Highland Renewable Energy Strategy and Planning Guidelines (HRES) on 4th May 2006 as non-statutory Supplementary Planning Guidance (SPG). The Strategy sets renewable energy targets for The Highland Council region and identifies preferred zones for renewable energy development.

2.225 The aim of the HRES is to:

"…harness both the energy and economic potential presented by renewable technologies in the Highland area to provide benefit for both the global environment and local communities. In doing so, the elements of the natural and landscape heritage that define the Highlands area for locals and visitors will be protected. However, it is recognised that change is an integral part of cultural heritage and that the Highland area needs new developments in order for communities and businesses to flourish. Renewable energy projects will, therefore, be developed in ways that protect the integrity of particularly valued sites, maximise local and regional benefits and minimise or avoid negative consequences" (Page 7).

2.226 The strategy proposed a geographical vision of renewable energy for 2010. The HRES defined four scales of renewable energy development, minor, local, major and national.

2.227 Policy E5 of the HRES refers to preferred development areas for wind farm developments it states:

"Preferred development areas have been established for major and national scale onshore wind developments. There are 3 designated areas which contain optimal conditions in terms of planning constraints, energy production, technical feasibility and proximity to grid. The detailed suitability of all prospective sites still needs to be confirmed through the normal planning processes. There will, however, be a strong presumption in favour of projects proposed for these designated areas, and developers will be encouraged to come forward with proposals there subject to appropriate community and environmental safeguards" (Page 15-16).

2.228 It is relevant to note that a requirement to review the HRES, in particular the section of the document relating to onshore wind energy, was recommended to the THC Planning, Environment and Development Committee of 28th May 2008. In the summary of the Report

to Committee, it notes that SPP 6 issued in March 2007 sets out a specific methodology for planning for onshore wind energy development. The report notes that the advice in the former SPP 6.

"Differs from the HRES approach and which all local planning authorities have been instructed to implement as a matter of urgency. There is therefore a need to develop some new SPG for such developments in order to provide a sound basis for making decisions on planning applications. The new guidance will effectively review and replace the relevant part of the HRES" (Page 1).

2.229 Paragraph 1.1 of the Report to Committee notes that whilst the HRES covers a wide range of technologies, of these:

"it is onshore wind that has had most development in recent years and the planning of which has 'tested' the Council's document…. however the part relating to onshore wind energy, and particularly to large wind farms, requires review as a matter of urgency because it has been overtaken by national policy in Scottish Planning Policy 6" (Page 1).

2.230 Therefore, whilst the HRES document remains as SPG, the onshore wind elements of it are under full review and are to be replaced by new SG.

Highland Council Interim Supplementary Guidance for Onshore Wind Energy

2.231 The draft SG entitled 'Committee Draft November 2010' was reported to the Planning, Environment and Development Committee on 17th November 2010. A full public consultation on the draft SG commenced in April 2011 and the consultation period ran to 24th June 2011.

2.232 Following consultation on the draft, The Highland Council Interim Supplementary Guidance for Onshore Wind Energy was approved by the Planning, Environment and Development Committee on 14 March 2012.

2.233 The SG does not have Development Plan status and is a material consideration in the determination of wind energy development proposals.

2.234 The Council are continuing to work on the cumulative Landscape and Visual Impact Assessment, particularly with key partners such as SNH and this on-going work will result in further refinement of the SG, which will be subject to further consultation and ultimately will form part of the Local Development Plan.

2.235 The Interim SG provides:

- a spatial framework to guide the location of large wind farms;
- development guidelines for all locations; and
- additional guidance.

2.236 The spatial framework provides a steer in particular to large wind farm development proposals by identifying a number of development constraints. It should be noted that *"the spatial framework and this guidance in general do not prevent proposals coming forward in any part of Highland and these need to be able to be assessed and considered having regard the constraints"* (paragraph 2.3, page 6).

2.237 The guidance identifies different typologies of wind energy development and characterises these by scale.

2.238 The Proposed Wind Farm Development is categorised as a 'large' wind energy development. The capacity criteria for this category includes wind farms over 20 MW.

2.239 The guidance notes that developments outwith safeguarded areas could result in a number of development impacts and will require to be assessed in the context of HwLDP and the Interim Guidance. In addition to the constrained areas identified in the maps contained within the Interim Guidance, there are also other constraints which may significantly constrain development and will require assessment in the context of the HwLDP and the SG.

2.240 The SG provides its spatial strategy on the basis of three stages as follows:

- Stage 1 – areas requiring significant protection;
- Stage 2 – areas with potential constraints; and
- Stage 3 – areas of search.

2.241 Stage 1 areas include sites designated as:

- Special Protection Areas;
- Special areas of conservation;
- RAMSAR sites:
- Sites of special scientific interest;
- National nature reserves;
- National scenic areas; and
- National Parks.

2.242 These areas have been excluded from the Areas of Search.

2.243 Stage 2 areas are areas where proposals will be considered on their own individual merits. Stage 2 Areas include sites designated as:

- Historic Gardens and Designed Landscapes;
- Conservation Areas;
- Special Landscape Areas;
- Sites of Local Nature Conservation Importance;
- Ancient Woodland of semi-natural origin;
- Geological Conservation Review sites;
- Views Over Open Water;
- Long Established Woodland of Plantation Origin;
- Settlement Development Areas (SDAs) and Zone extending 2 km beyond SDA boundary; and
- Airport Safeguarding Surfaces.

2.244 The areas covered by these features have been excluded from the Areas of Search.

2.245 Stage 3 Areas are areas within which appropriate proposals are likely to be supported subject to detailed consideration against the HwLDP and the SG. Stage 3 Areas are not covered by any of the constraints identified in the Stage 1 and 2 Areas.

2.246 Paragraph 2.16 of the Interim SG identifies that Policy 67 of the HwLDP sets out the 's overall policy for renewable energy in the Highlands. The Interim Guidance expands on the 11 criteria within Policy 67 in regard to proposals for on-shore wind energy developments. It also provides advice on assessing the degree and significance of impact where there is likely to be some impact or effect on a feature or interest.

2.247 Planning assessment matters raised in the Interim SG are assessed in detail within the Planning Statement.

Natural, Built & Cultural Heritage

2.248 The Guidance states that any proposal for a wind energy development that is likely to have a significant effect on a European site should be accompanied by sufficient information to allow the Council to carry out an appropriate assessment under the Conservation (Natural habitats & c.) Regulations 1994 as amended. It adds that such a proposal may only be permitted if the Council can conclude that the development will not have an adverse effect alone or in combination with any other proposal on the integrity of European sites unless there are no alternative solutions and there are imperative reasons of overriding public interest for doing so. It further adds that any proposal must also demonstrate that it will not compromise the amenity and heritage resources, where there may be significant adverse effects on nationally important features; these must clearly be outweighed by social or economic benefit or national importance. It adds that any wind energy proposal must demonstrate that the development will not have a significant adverse effect on the site, context and setting of historic environment assets. These considerations may apply to both designated and significant undesignated assets and areas.

2.249 The Interim SG notes that SG will be produced specific to wild land, setting out how best to accommodate change within areas of Wild Land, while safeguarding the wild land qualities. In the meantime applicants are directed to SNH search areas for Wild Land and the associated impact assessment guidance, which is available on the SNH website.

Other Species & Habitat Interests

2.250 In relation to species and habitats, developers are advised to refer to Policies 58, 59, 60 and 74 of the HwLDP. The Council is currently producing SG on protected species matters.

Landscape and Visual Impact

2.251 The SG states that any proposal for a wind energy development must demonstrate that the development will not have a significant adverse effect individually, or cumulatively on:

- local landscape character;
- any Special Landscape Areas;
- any National Scenic Area;
- wild areas;
- important public views;
- the setting of any Schedule (Ancient) Monument; Designated Landscape, listed building or conservation area and other historic sites; and
- the spatial framework including areas of search for wind energy development and areas of constraint.

2.252 The Interim Guidance also provides advice on mitigation measures.

Amenity at Sensitive Locations

2.253 Paragraph 2.38 of the Interim Guidance states "*the Council would encourage turbines associated with large scale wind energy developments to be located at a distance of at least 2 km from the development boundaries of settlements (as defined in Local Plans), especially where they are likely to a prominent feature in an open landscape. Within this distance, applications will continue to be judged on a case by case basis. Community amenity impact should be assessed at a range of receptors including residential properties, work places, and recognised visitor sites. This should include consideration of receptors outwith any defined settlement boundary. In respect of residential amenity specifically, a development that has been judged to have significant long term judgemental impacts will not be supported*".

2.254 In relation to noise impact, the guidance states that the Council will continue to apply the standards of noise arising from wind turbines not exceeding 35dB at any noise sensitive location. It is added that the Council is currently considering preparing guidance on the issue of cumulative noise impacts. It is noted that ETSU-R-97 permits a higher level of noise at properties where the occupant has a financial involvement in the development. The guidance urges developers to consider adequate mitigation of any adverse effects.

Safety & Amenity of Individuals & Individual Properties

2.255 The guidance identifies that any proposal for wind energy development must demonstrate that the development will not have a significant adverse effect on the safety and amenity enjoyed by any residential property. Considerations include noise pollution, ice throw in winter conditions, shadow flicker or shadow throw. In line with Scottish Government advice, the Interim Guidance states that the Council will expect wind energy developments to be located at least a minimum distance equivalent to 10 times the blade diameter from any regularly occupied buildings not associated with the development and at least the minimum distance equivalent to the height of the turbines to blade tip from main public roads and railways. The Guidance notes that it is important to consider the impact of the proposed wind energy development on permitted land uses or those which are included at specific proposals within the development plan and therefore states that the Scottish Government's Sustainable Land Use Strategy should be referred to.

The Water Environment

2.256 The Guidance notes that developments should demonstrate that the development to the

requirements of the Water Framework Directive the guidance adds that proposals should demonstrate including its associated infrastructure will not have a significant adverse effect individually or cumulatively on the water environment. The Interim SG provides further guidance for proposals where peat is present on-site.

Safety of Airport, Defence & Emergency Service Operations

2.257 The Interim SG states "*any proposal for a wind energy development must demonstrate that the development including its associated infrastructure will not a significant adverse effect individually, cumulatively (with other built, permitted or lodged wind energy proposals) on airport, defence or emergency service operations. This includes flight activity; navigation and surveillance systems; and associated infrastructure*". (paragraph 2.49, page 21)

2.258 The Interim SG directs wind energy developers to the following information:

- MOD 'Safeguarding Extents';
- Health & Safety Executive Safeguarding Zones;
- NATS En Route Plc Safeguarding Maps3; and
- Department of Trade and Industry "Wind Energy and Aviation Interest – Interim Guidance".

The Operational Efficiency of Other Communications

2.259 The Interim SG states that the siting of wind turbines must have regard to radio, TV, telecoms, and other communication systems and that proposed developments will be assessed by consultation with relevant operators.

The Quantity & Quality of Public Access

2.260 The Guidance notes that any proposal for wind energy development must demonstrate that the proposal will not have a significant adverse effect on the quality and quantity of public access (including effects on the core paths, access point to water, wider access rights for or Rights of Way). It also urges developers to consider adequate mitigation measures.

Other Tourism & Recreation Interests

2.261 The Council have identified a range of considerations which may include and are not limited to the following effects on the local and national economy:

- the scale and nature of any potential economic spin-offs for local businesses and employment opportunities;
- effects on industries for which the Highland's landscape is important; and
- effects on industries such as forestry arising from changes to land use and management.

Traffic & Transport Interests

2.262 The Interim SG states that any proposal for a wind energy development must demonstrate that it will not have a significant adverse effect individually or cumulatively on the public road network. The guidance states that developers will be required to undertake a Transport Assessment to establish the transport impacts associated with the proposed wind energy development. It further adds that developers will be required to enter into a section 96 (Roads Scotland Act) agreement with the Council to cover damage to the public roads by construction traffic and may be required to provide a bond as security.

2.263 The Interim Guidance also identifies a number of other considerations which will need to be taken into account in the determination of any application for wind energy developments. These are considerations include:

- community renewable energy developments;
- design and layout of wind farms;
- forestry;
- peat;
- electricity transmission cables and lines and gas transmission underground pipelines;
- impacts of other proposed developments on existing or consented wind farms;
- site restoration; and
- mitigation (further information is provided on Page 24 – 27 of the Interim SG).

Supplementary Planning Guidance: Moray Onshore Wind Energy (2013)

2.264 The above guidance provides Moray Council's spatial strategy for wind energy development within the Moray Council area. Due to the proximity of the Proposed Wind Farm Development to the Moray Council administrative boundary the guidance has some relevance to the EIA, particularly **Chapter 7: Landscape and Visual** where the guidance is considered in more detail.

National Planning Policy Framework 3 – Main Issues Report

2.265 The National Planning Policy Framework 3 (NPF3) Main Issues Report was issued for consultation on 30 April 2013 and the consultation period ran to 23 July 2013. It sets out a long term strategy for the spatial development of Scotland and when approved in its final form, will replace NPF2. It forms the spatial expression of the Government's economic strategy. Paragraph 1.2 states that the Government's ambition is a "*Scotland with a growing, low carbon economy…*" It adds that at paragraph 1.3 that amongst the most important challenges faced in achieving these ambitions are:-

- A global economic downturn;
- Meeting our ambitious targets for reducing greenhouse emissions, whilst planning to adapt to the consequences of inevitable climate change.

2.266 Paragraph 1.8 sets out a vision of Scotland which inter alia is:-

"A low carbon place – we have seized the opportunities arising from our ambition to be a world leader in low carbon energy generation…"

2.267 Paragraph 1.12 states that to help make Scotland as a whole a low carbon place, the spatial strategy should inter alia:-

- Support the further deployment of onshore wind farms, but balances this with our

commitment to protection for our nationally important landscapes and residential amenity;

- Helps to retain the benefits of renewable energy development in Scotland by supporting investment to key sites across the country.

2.268 Chapter 2 of Draft NPF3 is entitled 'A Low Carbon Place' and at paragraph 2.4 states that for the energy sector, the Government is committed to achieving a number of long term targets and these include inter alia:

- Reduce total final energy demands by 12% by 2020 (from 2005 - 2007 baseline);
- Meeting at least 30% of overall energy demand from renewables by 2020 (this includes generating the equivalent of at least 100% of gross electricity consumption from renewables by 2020, with an interim target of 50% by 2015);
- Achieving at least 500 MW of renewable energy in community and local ownership by 2021.

2.269 Paragraph 2.7 states that the Government proposes that the NPF3 should build on NPF2 and help to deliver measures including:-

"Supporting the further deployment of onshore wind farms whilst addressing concerns raised about the impacts of some wind energy developments".

2.270 Onshore wind is specifically addressed at page 13 and paragraph 2.14 states that the target of generating the equivalent of at least 100% of gross electricity consumption from renewables will require around 14-16 GW of capacity to be deployed over the 7 years and that:

"onshore wind will play a significant role in achieving the target. Whilst we will increasingly see the development of offshore renewable energy generation, the further deployment of onshore wind remains a key strand in our efforts to reduce greenhouse gas emissions and achieve a balanced energy supply".

2.271 Para 2.15 adds that:-

"The Scottish Government supports onshore wind development in appropriate locations. The contribution of onshore wind is making to our energy generation sector is evidence of its success of our approach. So too is the fact that developments to date have largely avoided our nationally and internationally protected areas".

2.272 The NPF is likely to be considered by the Scottish Ministers mid-way through 2014 and published as the final National Planning Framework thereafter. The NPF 3 will have statutory status as a national expression of planning policy.Draft Scottish Planning Policy 2013

2.273 A draft Scottish Planning Policy (dSPP) was issued by the Scottish Government on 30th April 2013 for public consultation. The consultation period ran until 23 July 2013. The document contains a number of relevant renewable energy policy expressions and these are summarised below.

2.274 The purpose of the dSPP is set out at paragraph 4 where it is stated that it sets out national planning policies which reflect Scottish Ministers' priorities for the development and use of land. It is a non-statutory statement of Scottish Government policy on how nationally important land use planning matters should be addressed across the country.

2.275 Page 5 sets out 'outcomes' for planning in the context of the hierarchy of Scottish Government purposes and national outcomes and explains how they link down the hierarchy to SPP 'Contributions'. A key planning outcome is shown in the table on page 5 *as "planning supports sustainable economic growth and the transition to a low carbon economy".* The key SPP policy contribution is noted as being *"delivering heat and electricity".*

2.276 Sustainable economic growth is set out as a principal policy on page 6 of the document and paragraph 17 sets out policy principles. In this regard it is stated that the planning system should:-

- Through the development plan, set out a spatial strategy to deliver sustainable economic growth.
- Foster a business environment which is supported to new investment across Scotland while protecting and enhancing the quality of the natural built environments as assets of national importance.
- Attach significant weight to economic benefit of proposed development as a material consideration, particularly the creation of new jobs, recognising and responding to economic and financial conditions;
- Support infrastructure delivery and innovation in the energy … sectors to support the transition to a low carbon economy.
- Sustainable development is considered on page 8 and paragraph 27 states that planning has an important role "*in realising sustainable development*". It adds that the planning systems contributes by encouraging and improving development that is of a good quality and inter alia;
- Helps to reduce greenhouse gas emissions; and
- Is energy efficient and facilitates the generation of electricity and heat from renewable and low carbon sources.

2.277 Paragraph 34 states that the planning system should help to address climate change through inter alia, mitigation by means of minimising carbon and other greenhouse emissions and through supporting the expansion of renewable energy generating capacity.

2.278 The main section in the dSPP with regard to onshore wind development is contained within the chapter entitled 'Utilities' on page 48. In this section, with regard to delivery of electricity, the key policy principles are set out at paragraph 208 which states that:-

"The planning system should support the transformational change to a low carbon economy and be consistent with national objectives and targets including delivering:-

- *The equivalent of 100% of electricity demand from renewable sources by 2020;*
- *30% of overall energy demand from renewable sources by 2020*".

2.279 There is reference to key documents and these include the Electricity Generation Policy Statement and the 2020 Routemap for Renewable Energy in Scotland.

2.280 The dSPP makes it very clear that the Scottish Government remains committed to significant transformational change to a low carbon economy and there remains a strong drive to attain 100% of electricity demand from renewable sources by 2020 and to achieve a further interim 50% target by 2015.

Conclusions

2.281 This chapter has set out the relevant planning policy framework that would apply to the determination of the current application for the Proposed Wind Farm Development. It has provided a description of the relevant planning policy framework, focusing on those most relevant policy statements. The application for consent is accompanied by a Planning Statement which provides a formal assessment of the Proposed Wind Farm Development in the context of the policy framework set out above.

3 Design Evolution and Alternatives

Introduction

3.1 In this chapter, a description is given of the site selection process and design strategies that were adopted in arriving at the Proposed Wind Farm Development described in **Chapter 4: Description of Development**. Firstly, general design principles adopted by RES are outlined and the design objectives for the Proposed Wind Farm Development are stated. Thereafter, an overview of the layout evolution of the Proposed Wind Farm Development is given, including references to identified / adopted design constraints that include details of the further refinements made to the turbine layout between conception and this application. Finally, the design considerations and decisions regarding the Site infrastructure are explained.

General Principles of Wind Farm Design Adopted by RES

3.2 There are a number of ways in which a wind farm can be designed, but all approaches involve balancing the potentially conflicting interests of:

- technological / economic requirements (high energy production from the turbines and low inter-turbine distortion of the wind flow);
- landscape character and visual amenity; and
- constraints concerning natural and built heritage such as ecological, hydrological and archaeological interests and utility services such as pipelines and microwave links.

3.3 The amount of weight to be attached to each element is a site-dependent consideration, and leads to different design approaches and strategies. Typical design approaches include:

- establishing and mapping constraints related to natural and built heritage, developing a layout that best satisfies technological / economic requirements and adjusting the design to improve visual appearance;
- adopting a specific design strategy that addresses aesthetic and functionality targets and thereafter identifying whether the impacts on other non-visual environmental interests are sufficiently severe to warrant compromising the visual design. In establishing a design strategy, guidance contained in the siting and designing wind farms in the landscape, Version 1 (Scottish Natural Heritage (SNH), December 2009) is referred to; and
- establishing and mapping natural and built heritage constraints as per the first approach, but then developing a layout which achieves visual balance and harmony from key viewpoints. Thereafter only altering the layout if essential engineering requirements are compromised, for example if the fatigue loading on a turbine would be beyond the level that turbines are built to withstand.

3.4 For the Proposed Wind Farm Development, the design aim has been to reduce landscape and visual impacts, whilst achieving a wind farm that has an appropriate fit with the landscape, in terms of the size and location of turbines, and avoiding areas constrained by other environmental considerations such as ecology, hydrology and archaeology.

3.5 In designing the initial layout, known environmental, technical and engineering constraints were mapped. The next stage involved altering the layout to incorporate design principles resulting from a preliminary landscape and visual appraisal report (prepared by LUC), and results from a peat depth study, whilst avoiding the constraints previously identified. The layout was then amended further, following completion of the baseline environmental surveys and a design workshop with the project consultants. During this, the layout was adapted in response to the environmental information gathered, whilst maintaining the landscape and visual design principles. Lastly, the layout was refined to incorporate final constraints and to ensure essential engineering requirements were met. This iterative design process is explained in more detail in Section 3.31 to 3.32.

Development Considerations

Context of the Site

3.6 The Site is located to the south east of the small settlement of Ferness in Nairnshire, within The Highland Council (THC) area, and is approximately 15 km southeast of Nairn and 13.5 km northwest of Grantown-on-Spey. The Site Boundary covers approximately 666 hectares, or 1647 acres.

3.7 The Site is dominated by a mixture of degraded bog and heath habitats with localised wooded areas and a few scattered mature trees. The Site is managed at a fairly low level for grazing, localised peat-cutting and burning. Evidence of earlier management is present in the forms of systematic drainage channels.

3.8 There are several minor water courses on- site of less than 1 m in width and less than 0.5 m in depth. The southern part of the Site is drained by the Burn of Lochantùtach, which runs east and north to the Dorback Burn, that lies to the east of the Site. The northern part of the Site is drained by the Stripe of Muckle Lyne and the Stripe of Little Lyne, which both drain northwards into the River Findhorn. To the south of the Site lies the oligotrophic Lochan Tùtach.

3.9 275 kV overhead transmission lines mounted on steel pylons traverse the northern part of the Site east to west.

3.10 The Site is bordered to the west by the A939 and to the north by existing forestry plantations. To the south, the Site boundary stops approximately 250 m north of the Local Authority boundary between THC and Moray Council, and to the east, the Site boundary stops approximately 20 m west of the Local Authority Boundary. The Site lies fully within THC area.

Topography

3.11 The Site includes Cairn Duhie, at 312 m Above Ordnance Datum (AOD), a low conical shaped hill, with land sloping down from the top in all directions. The lowest point of the Site is 200 m AOD at the north edge. Beyond the site, the land slopes down to the deeply incised River Findhorn Valley to the north and northwest. To the east, the land slopes down to the shallow Dorback Burn valley (a tributary of the River Findhorn), beyond which steep slopes lead up to the Knock of Braemoray. To the south, the Hill of Aitnoch lies beyond Lochan Tùtach.

Scale and Form

3.12 Whilst the Site itself is relatively flat and open, it is enclosed by the large scale elevated topography of Hill of Aitnoch to the south and the Knock of Braemoray to the east. This sense of partial enclosure is increased by the presence of coniferous plantations that occupy areas of the slopes above the River Findhorn Valley, to the north. In contrast, the broad valley of the Anaboard Burn to the south east allows open views towards the Site.

Experience of the Site

3.13 This is a transitional landscape subject to the influence of the more open / remote moorland and summits of Knock of Braemoray to the east, Hill of Aitnoch and Dava Moors to the south, and the managed landscape of the lower lying, and often forested land to the north. Views from the Site are of medium scale and largely focused on the Knock of Braemoray, but also extend across the moorland to the south, towards the distant Cairngorms Massif. Views northwards are towards nearby forests, but with views of distant hills beyond the Moray Firth from elevated locations on the Site. This is a landscape of moderate quality and condition with few built structures.

3.14 Based on the characterisation of the landscape as set out in **Chapter 7: Landscape and Visual Assessment** of the ES, the Site is located in an area of Open Uplands that extend into Moray, and form a transitional area between higher ground associated with the Cairngorms and lower coastal land. Open Upland landscapes are typified by rounded hills and summits of generally similar height, broad smooth ridges and extensive gently undulating plateaux. Land cover in these landscapes comprises a mixture of heather moorland and bog, with scattered clumps of native pine. Further north, the landscape beyond the Site boundary extends into an area of Narrow Wooded Valleys which has a more enclosed character.

3.15 Viewed from locations across the wider area, the Site is visible from elevated locations nearby (e.g. Hill of Aitnoch, Knock of Braemoray and other summits), and from roads near the Site boundary, where screening of intervening topography and vegetation allows. From further afield, the Site is visible from high ground, but there is limited visibility from lower lying land to the north, due to intervening screening by vegetation. This is illustrated in the visualisations accompanying **Chapter 7: Landscape and Visual Impact Assessment** of the ES, which can be found in **ES Volume 3: Landscape and Visual Figures**.

The Highland Council: Interim Supplementary Guidance on Onshore Wind Energy Development

3.16 The Highland Council Interim Supplementary Guidance for Onshore Wind Energy was approved by the Planning, Environment and Development Committee on 14 March 2012. The Supplementary Guidance does not have Development Plan status and is a material consideration in the determination of wind energy development proposals. The Supplementary Guidance provides: a spatial framework to guide the location of large wind farms, development guidelines for all locations, and additional guidance.

3.17 The spatial strategy is provided on the basis of three stages as follows:

- Stage 1 – areas requiring significant protection;
- Stage 2 – areas with potential constraints; and
- Stage 3 – areas of search.

3.18 The Cairn Duhie Site lies mainly within a Stage 3 area of search and partially within a Stage 2 area, with potential constraints. The potential constraints relate to the proximity of the Site to the settlement of Ferness. Intervening topography provides screening between the village and the Proposed Wind Farm Development, limiting views. Further information is provided in **Chapter 7: Landscape and Visual Assessment**. Further details of THC Interim Supplementary Guidance are provided in **Chapter 2: Planning and Policy Context**.

Sustainable Design

3.19 HwLDP Policy 28: Sustainable Design and Moray Local Plan Policy IMP1: Development Requirements provide guidance on designing developments that are sustainable and sensitive to local surroundings. This guidance has been taken into account in the design of the Proposed Wind Farm Development. A Sustainable Design Statement has been produced to demonstrate that the design of the Proposed Wind Farm Development is compliant with the standards set out in THC's Sustainable Design Guide. This is contained in the standalone Design and Access Statement, which accompanies the application for Section 36 consent.

Site Selection and Alternatives

Alternative Sites

3.20 In 2000, RES undertook a sophisticated computer-based analysis to establish wind farm site suitability across Scotland. Use of Geographic Information Systems (GIS) technology enabled objective and consistent treatment of the whole country and this work has since been updated regularly, when new data has become available or other factors have changed. The Site was identified by RES as a potential site based on having a good site suitability score on the GIS Site Selection Model. The overall suitability score is the result of the combination of different scored criteria. All input data is classified and scored on a range of 0-1, where 0 represents land that is unsuitable for wind farm development (and is therefore removed from the final preferability layer) and 1 represents land that is entirely suitable or has no

conflicting issues. The scores can be multiplied by 100 to identify the percentage preferability that they represent (i.e. 0.5 represents 50% preferability).

3.21 The key factors included in the GIS modelling are listed in the following sub-sections.

Landscape, Natural and Built Heritage

3.22 Incorporating designations of international, national and local status, the GIS scores the areas according to their sensitivity, in keeping with SNH guidance. International and Natura 2000 designations are scored 0 and the areas are removed from further consideration. Other designations are scored between 0 and 1 as appropriate. Layers are multiplied together so that multiple designations in one location results in downgraded score (e.g. two overlapping areas both of 0.5 results in a score of 0.25).

3.23 The Site lies in an area with a good preferability score for natural built heritage. There are no international or national designations known to exist on the Site. The Cairngorms National Park lies approximately 8 km to the south of the Site boundary (described in further detail in **Chapter 7: Landscape and Visual Assessment**). Other natural and built heritage conservation designations within the surrounding area include Moidach More Site of Special Scientific Interest (SSSI), Darnaway and Lethen Forest Special Protection Area (SPA) and Relugas House Garden and Designed Landscape (GDL) (described further in **Chapters 8: Ecology, 9: Ornithology** and **10: Archaeology and Cultural Heritage** respectively).

Wind Speed

3.24 The wind speed is appropriate for wind energy generation.

Proximity to Housing

3.25 The GIS uses a housing density layer, buffered by 800 m, to remove from consideration all but the lowest density housing. In addition, low density housing is looked at on a more specific basis and a clearance of 900 m from the nearest turbine was implemented for the Site, which is 10 times the rotor diameter of the proposed turbines. The Proposed Wind Farm Development is well placed, with only limited housing in its immediate vicinity. The closest property is over 1.1 km away from the nearest turbine.

Combined Score

3.26 Having scored with medium to excellent preferability on all inputs, the combination of the scored layers results in a good score for the Site. Figure 3.1 shows the Site Selection Result Layer score. Warmer colours from green through yellow, orange and red represent suitability for wind farm development whereas cold colours of blue and purple are less suitable. Black areas are scored 0. It can be seen that this Site scores well on the current result Layer.

Aviation and Radar

3.27 A complex layer showing the location of radar line of sight and other aviation considerations was created in 2010. This aviation and radar data is included in the GIS for information, but not scored and combined into the Result Layer. This valuable resource shows us at this early stage that the Site lies in the line of sight of Inverness Airport radar, highlighting the need for further investigation.

3.28 Finally, a visual sweep of the following informative, non-constraining GIS layers was made and those which impinged on the Site were noted:

- MOD Tactical Training Areas;
- electromagnetic links and utilities;
- location of existing wind farm sites (pre-planning, consented and operational); and
- other information gleaned from maps or knowledge of the area such as masts, undesignated parks, tourist attractions, etc).

3.29 Once the Site was identified an approach to the landowner was made. RES subsequently entered into a land agreement with the landowner and initial development work, including a scoping consultation, was undertaken between 2002 and 2007. A decision was taken to put the project on hold in 2007 due to grid capacity issues. In 2011 the project was started afresh and new survey work commenced.

Design Evolution and Alternative Layouts

3.30 The final Infrastructure Layout, as described in **Chapter 4: Description of Development**, evolved through a number of iterations to both the layout of the turbines and the design of the supporting on-site infrastructure. The final Infrastructure Layout overlain on a map of Site constraints is shown in Figure 3.2, the turbine layout evolution is shown in Figure 3.3 and the infrastructure evolution is shown in Figure 3.4. The design evolution process is described in the following sections.

Turbine Layout

Iterations of Design

3.31 There were four principal iterations of the turbine layout, which were developed at different stages in the project process:

- the initial feasibility / screening stage, when turbines were located based on preliminary constraints only, prior to baseline environmental surveys being completed;
- the initial constraint information stage, when a preliminary landscape and visual appraisal study and a peat probing survey had been undertaken; however further detailed technical, environmental and engineering studies were still to be completed;
- the detailed constraint information stage, when further baseline constraint information had been gathered; and
- the project design / EIA scoping stage when the baseline constraints were fully defined and an informed design layout could be developed. At this stage a clear design strategy could be selected.

3.32 These layouts are numbered 1 to 4 in Figure 3.3: Turbine Layout Evolution.

Initial Feasibility / Screening Stage

3.33 The initial layout for the Site was developed solely for internal consideration within the Applicant team prior to the completion of the baseline technical environmental and engineering studies. The layout was informed by the following constraints: water course buffers, overhead line buffer, telecommunications links, slope, 150 m set back from the A939 and 10 x rotor diameter minimum separation distance from housing.

3.34 This identified that the Site could potentially accommodate a maximum 30-turbine layout with a 93 m rotor diameter, allowing for tip heights of approximately 125 m, or a maximum 38-turbine layout with an 82 m rotor diameter. These layouts (1a and 1b respectively) are shown on Figure 3.3.

Initial Constraint Information Stage

3.35 An initial Landscape and Visual Appraisal was undertaken (by LUC) in order to understand the landscape capacity of the area and the potential visibility of a wind farm development on the Site. The study included:

- a desk top review of relevant planning policy, relevant national and local level landscape designations and the relevant Landscape Character Assessments (LCAs);
- a desk top review of existing wind farm development proposals within 15 km of the Site, and consideration of potential cumulative landscape and visual issues;
- identification of potential key viewpoints to be used for feasibility work;
- provision of initial advice on the ability of the landscape to accommodate a wind energy development, including advice regarding the appropriate scale of development and turbine size etc; and
- provision of initial wind farm layout advice, which responded to the identified potential landscape and visual constraints of the Site:
  - to create a compact and tidy layout that reads as one wind farm, which avoids gaps and elongation, north to south;
  - to respond to the gentle domed topography of the Site;
  - to create a layout with the appearance of similar height turbines throughout;
  - to avoid excessive overlapping of turbines in key views;
  - to avoid turbines appearing as outliers in key views;
  - to achieve a compact grouped layout that is balanced in views from key viewpoints;
  - to reduce potential impacts on designated landscapes to the south, including the Cairngorms National Park, by avoiding placing turbines in the southernmost parts of the Site; and
  - to avoid placing turbines in the southernmost parts of the site which are the most sensitive in terms of landscape character, with glacial features such as kettleholes.

3.36 Following advice from the Landscape and Visual Appraisal a decision was made to limit the tip height of the turbines to 110 m. In addition, a decision was made by the Applicant to base the design on a fewer larger rotor turbines (90 m rotor) rather than larger number of smaller rotor turbines (82.4 m rotor) to produce a less cluttered layout and maximise energy yields.

3.37 A peat depth survey was also completed based on a 100 m grid across the Site (described in **Chapter 8: Ecology** and **Technical Appendix 8.3**). Development on peat depths in excess of 1.5 m was minimised as far as possible in the layout design.

3.38 In response to the Landscape and Visual Appraisal and peat depth survey, a 25-turbine layout was produced which was considered to represent the most appropriate arrangement of turbines, turbine size and numbers of turbines, based on the design principles and the constraint information available.

3.39 This layout is shown in Layout 2 of Figure 3.3.

Detailed Constraint Information Stage

3.40 Further technical environmental assessments were carried out to determine the baseline environmental conditions on the Site, including:

- ornithological surveys, undertaken between September 2011 and August 2012;
- ecological surveys (including an Extended Phase 1 habitat survey and NVC survey, peat survey, protected species survey, bat surveys and a fisheries survey), undertaken between July 2011 and October 2012;
- hydrology surveys, undertaken in July 2012; and
- archaeology and cultural heritage surveys, undertaken in July 2012.

3.41 A further constraints exercise was undertaken overlaying each environmental constraint on top of each other. Taking into consideration the design advice identified by the Landscape and Visual Appraisal, suitable turbine locations were identified and the turbine positions were optimised by taking account of all the constraints.

3.42 A design workshop was held by RES which was attended by various technical, engineering and environmental specialists from the project team to refine the layout, resolve potential conflicts and agree actions for further assessment.

3.43 The layout identified following the design workshop is shown in Layout 3 of Figure 3.3

Project Design / EIA Scoping Stage

3.44 A second design workshop was held to refine the layout in response to further assessment actions identified at the first design workshop and updated constraint information, whilst ensuring landscape and design principles were met. This included:

- background noise monitoring data;
- updated telecommunications link information;
- further assessment of groundwater dependent terrestrial ecosystems (GWDTE);
- proximity to a neighbouring land boundary;
- wake / proximity effects on potential energy yield; and

- new guidance on stand-off distances from overhead transmission lines, published by the Energy Networks Association in August 2012[1].

3.45 The final turbine design layout is shown in Layout 4 of Figure 3.3. This layout, of 20 turbines with a maximum tip height of 110 m, was proposed in the request for an EIA scoping opinion in May 2013. The change in layout from the original feasibility stage layout to the final turbine design layout has resulted in reduction or minimisation of:

- potential effects on the Drynachan, Lochindorb and Dava Moors Special Landscape Area (SLA);
- potential effects on archaeology and the settings of listed buildings and scheduled monuments;
- potential impacts on hydrology and GWDTEs;
- potential impacts on peat and the generation of spoil;
- potential effects on ecology;
- potential effects on EMI links;
- potential noise impacts at surrounding residential properties;
- potential cumulative landscape and visual effects; and
- sequential cumulative effects on important transport routes including the A939 and A940.

On-site Infrastructure

3.46 As described in **Chapter 4: Description of Development**, the permanent infrastructure consists of elements including road improvement works on the access route to the Site and on-site elements including the on-site tracks, the substation compound and control building a permanent meteorological mast, a permanent communications mast and temporary construction facilities.

3.47 The on-site infrastructure has undergone a number of revisions, and these are show in Figure 3.4 Infrastructure Design Evolution and identified as 'Designs' 1 to 3.

3.48 Design 1 is a preliminary design based on Turbine Layout 3 of Figure 3.3. It was produced for discussion with the project team at the second design workshop. The design sought to avoid identified constraints and sensitivities, whilst achieving a balance of minimising overall track length and minimising the amount of cut and fill by avoiding steeper slopes and following natural contours as far as possible.

3.49 Design 2 was prepared following the production of the final turbine layout (Turbine Layout 4 on Figure 3.3), incorporating feedback from the design workshop and a full infrastructure design review. The track design was updated in response to the final turbine positions. Other key changes at this iteration included the addition of the permanent meteorological mast, optimisation of the orientations of crane pads to reduce cut and fill and an increase in size of the control room and substation compound. Sections 3.55 to 3.56 provide more detail on the control room and substation location and design.

3.50 Design 3 shows the final infrastructure layout. This was produced following a detailed site walkover by project engineering, technical and development staff to 'ground truth' and make final refinements to the design and to incorporate feedback from construction and operational teams. Key changes at this stage included the addition of temporary meteorological masts, the addition of a temporary storage area for turbine components and a small increase to the size of the temporary construction compound, to accommodate necessary welfare requirements. The previous design iterations had included a temporary enabling works compound at the site entrance, to facilitate early construction activities before the creation of the temporary construction compound. Further examination identified that this could be safely accommodated within the part of the site entrance required for the delivery of abnormal loads, therefore the need for further temporary land take to accommodate a separate enabling works compound was removed.

3.51 In order to reduce the amount of stone required to be imported onto the Site to form the access tracks, it is often proposed to include one or more stone borrow pits in the planning application. However the stone on the Site is not ideal for wind farm construction and suitable stone is available off-site in the local area. Therefore it was decided not to use on-site borrow pits, thereby avoiding any associated landscape and visual effects.

3.52 The permanent met mast requires a location that reflects the undisturbed wind across most of the Site whilst minimising the requirement for additional track. This has been achieved in the final layout.

3.53 The construction compound is required to be located close to the Site entrance and turbine locations for logistical reasons. It is proposed that the compound would be located close to the site entrance point from the A939, to ensure that the compound can be established prior to meaningful construction works on-site to allow the former to service the latter.

3.54 No water course crossings would be required as a result of the proposed infrastructure layout.

Control Room and Substation Compound

3.55 Whether the Proposed Wind Farm Development will connect into the electricity transmission system or distribution network is currently undetermined, therefore the on-site substation has been sized in order meet the larger potential dimensions which would be necessary for a transmission connection. If the wind farm is ultimately connected to the distribution network this footprint will be reduced. The substation consists of two buildings, a larger building in which to house the transformer equipment and a smaller control building. This is described in detail in **Chapter 4: Development Description** and accompanying figures.

3.56 The location of the control room and substation compound has been influenced by a number of factors. The compound is proximate to the Site entrance in order to be easily accessible throughout the operation of the wind farm, in all weather conditions. It is also broadly

[1] Energy Networks Association (August 2012) *Engineering Recommendation L44, Separation between Wind Turbines and Overhead Lines: Principles of Good Practice*

central to the wind farm, which reduces the overall length of cable that is required to inter-connect the Proposed Wind Farm Development. In addition, the compound is located on an area of flatter ground, beyond a localised horizon of steeper ground when viewed from sections of the A939 along the Site boundary. This positioning will help to screen the lower parts of the buildings, the effect of which will be enhanced by landscaping and tree planting to provide further screening (described in more detail in **Chapter 4: Description of Development**). The two buildings have been orientated to follow the natural slope of the hill, with the taller building positioned to the east of the smaller building. The finish and colour of the building will be agreed through consultation, and will be designed to integrate the buildings with the local vernacular style where possible.

Preferred Layout

3.57 The preferred infrastructure layout, presented as Figure 4.1 in **Chapter 4: Description of Development** of this ES, includes the following features:

- a reduction in the number of turbines, from 30 to 20, reducing the scale of the Proposed Wind Farm Development;
- a reduction in the maximum blade tip height, from 125 m to 110 m, reducing visibility of the Proposed Wind Farm Development, particularly from some hill summits within the National Park;
- a turbine arrangement which reflects Cairn Duhie's gentle domed topography;
- reduction of impacts on environmental, technical and engineering constraints and sensitivities identified through site survey and consultation; and
- reduction of overall land take and ground disturbance through careful design of site infrastructure including tracks and crane hardstandings.

Do Nothing Alternative

3.58 If no development was to occur then the environmental benefits associated with the Proposed Wind Farm Development would not be realised and the land would continue to be used for its current purpose of low level moorland grazing, peat cutting and burning.

Summary

3.59 The Proposed Wind Farm Development has been designed to optimise a number of factors including environmental, technological and engineering, and the preferred design option is being taken forward.

3.60 The design aim has been to achieve reduced landscape and visual impacts whilst achieving an appropriate fit with the landscape, in terms of scale and location, and avoiding areas constrained by other environmental considerations such as ecology, hydrology and archaeology.

3.61 20 turbines are proposed and the turbine tip height for the Proposed Wind Farm Development is up to a maximum of 110 m.

3.62 Ancillary infrastructure, both permanent and temporary, has been carefully sited to respect logistical, economic, visual and other environmental sensitivities.

4 Description of Development

Introduction

4.1 The Proposed Wind Farm Development comprises 20 three-bladed, horizontal axis wind turbines, each up to a maximum of 110 m to tip height, with a total installed capacity of up to 60 MW. The Proposed Wind Farm Development would include associated external electricity transformers, underground cabling, a newly created site entrance, access tracks, turning heads, crane hardstandings, control building and substation compound, a communications mast, a permanent free-standing meteorological monitoring (anemometer) mast and two off-site areas of widening to the public road. During construction and commissioning there would be a number of temporary works including a construction compound with car parking, a temporary storage area, temporary parts of crane hardstandings, welfare facilities and temporary guyed meteorological masts. Further information in relation to construction is reported in **Chapter 5: Construction and Decommissioning.**

4.2 The Site is shown on Figure 1.2: Site Boundary. A detailed plan of the Proposed Wind Farm Development showing the position of the turbines is shown on Figure 1.4: Turbine Layout and other infrastructure are shown in Figure 4.1: Infrastructure Layout. The off-site areas of road widening are shown in Figure 1.3: Road Widening Boundary.

4.3 This chapter provides a description of the physical characteristics of the Proposed Wind Farm Development for the purpose of identifying and assessing the main environmental impacts of the proposal.

Section 36 Application

4.4 The Section 36 application submitted with the ES relates to the land within the red line boundaries shown in Figure 1.2: Site Boundary and in Figure 1.3: Road Widening Boundary.

4.5 In this chapter, in order to differentiate between land-take and infrastructure that will be present for the wind farm life time and land-take and infrastructure which is only required for shorter-term works during the construction period, the term 'permanent' is used to describe the former and 'temporary' is used to describe the latter. However it should be noted that the Proposed Wind Farm Development would have a temporary operational lifetime of approximately 25 years from the date of commissioning, after which the above ground infrastructure would be removed and the land remediated as described in **Chapter 5: Construction and Decommissioning**. Therefore the effects are largely long-term temporary, as opposed to permanent.

4.6 Consent is being sought for the Proposed Wind Farm Development which comprises the following:

- 20 three-bladed horizontal axis wind turbines of up to 110 m tip-height;
- at each turbine, associated low to medium voltage transformers and related switch gear;
- a single permanent, free-standing meteorological ('met') / wind monitoring mast and a 10 m communication mast;
- six temporary guyed meteorological ('met') masts;
- turbine foundations;
- hardstanding areas and temporary lay-down areas at each turbine location for use by the cranes erecting the turbines;
- road widening works to facilitate access of abnormal load vehicles;
- creating a new site entrance from the public road network;
- creating new connecting on-site access tracks and turning heads;
- a wind farm sub-station compound containing a control building;
- underground cabling;
- a temporary construction compound;
- a temporary storage area;
- Sustainable Drainage System (SuDS) works;
- woodland and tree management;
- landscaping and ecological enhancement (as detailed in **Chapter 7: Landscape and Visual Assessment** and **Chapter 8: Ecology**, respectively);
- associated ancillary works; and
- engineering operations.

4.7 A description of these elements follows later in this chapter, including civil engineering, construction and erection aspects. Further details on construction are provided in **Chapter 5: Construction and Decommissioning.**

4.8 The EIA is based on the following plans:

- Site location– Figure 1.1
- Site boundary– Figure 1.2
- Road widening boundary– Figure 1.3
- Turbine layout– Figure 1.4
- Infrastructure layout– Figure 4.1
- Typical wind turbine elevation (110 m) drawing – Figure 4.2
- Typical masts – permanent, temporary and communications – Figure 4.3
- Wind turbine foundation drawing – Figure 4.4
- Crane hardstanding general arrangement – Figure 4.5
- Site entrance – Figure 4.6

- Typical access track details – Figure 4.7
- Cable trench typical sections – Figure 4.8
- Control room and substation compound plan - Figure 4.9
- Control room and substation compound elevation – Figure 4.10
- Typical Sustainable Drainage System (SuDS) details – Figure 4.11
- Woodland and scattered tree management – Figure 4.12
- Temporary construction compound layout– Figure 5.1

Site Layout and Required Flexibility

4.9 A plan of the Proposed Wind Farm Development showing the proposed locations of the turbines, met masts, access tracks and control building / sub-station compound is shown in Figure 4.1: Infrastructure Layout. In addition to this, details of the proposed access routes to the Site are shown in Figures 14.3: Construction Traffic Routes and 14.4: Abnormal Loads Route.

4.10 Although the design process, as outlined in **Chapter 3: Design Evolution and Alternatives**, seeks to optimise the layout in terms of environmental and technical requirements, the Applicant would nevertheless wish some flexibility, where necessary, in micrositing the exact positions of turbines and associated infrastructure including on-site access tracks (50 m deviation in plan from the indicative design). This reflects possible variations in ground conditions across the Site, which would only be confirmed once trial pits and boreholes for detailed site investigations are dug at the start of construction. Any repositioning would not encroach further into environmentally sensitive buffer areas, as shown in Figure 3.2 Infrastructure Layout and Constraints. In addition, 50 m flexibility in turbine positioning would help mitigate any potential environmental effects e.g. avoidance of archaeological features not apparent from current records (undiscovered remains).

Land Take

4.11 The turbines have a requirement to be spaced apart, so as not to interfere aerodynamically with one another (array losses). The actual land take is limited to the control room and sub-station, wind turbine towers and external transformers (if required), permanent crane hardstandings, permanent masts and on-site access tracks, which account collectively for approximately 1.58% of the total area within the Site.

4.12 Following completion of the turbine installation, the permanent land take would be approximately 189 m^2 at each turbine site, which includes the concrete plinth to which the steel tower is attached (approximately 5.5 m diameter) and path around the base of the turbine tower (approximately 5.0 m wide). The external transformer (if required) would take an additional 28 m^2 of land at each turbine. The completed foundation is covered with soil approximately 1.5 m deep, leaving only the concrete plinth to which the steel tower is attached. Movement of livestock around the tower would be unrestricted.

4.13 During construction, the working area at and around each turbine foundation would affect approximately 6,000 m^2 (0.6 ha) of land depending on local topography and ground conditions. Of this, 630 m^2 would be temporary hardstanding (which is included in the temporary hardstanding figures in Table 4.1 under crane pads and laydown areas). The turbine foundation is made up of a central excavation of approximately 20 m diameter and minimum 2 m to 3 m depth, but with sloping batters which would increase the excavated area to approximately 30 m diameter, greater where deeper peat is present. The 6,000 m^2 also includes an area to the side of the foundation and hardstanding which is required for temporary storage of the excavated material prior to back-filling.

4.14 The excavation area around each turbine is significant in terms of both its scale and duration of the works and as such requires consideration. Ancillary excavation works and material storage around other parts of the development, such as those for cable trenching, would have a negligible impact on environmental receptors due to the very minor scale of the excavation, or duration of the works and are not considered further in the ES.

4.15 Additionally, crane pad areas would be constructed adjacent to each wind turbine. Figure 4.5: Crane Hardstanding General Arrangement shows the general hardstanding arrangement; two configurations for the crane hardstanding are presented. Configuration 1 has a temporary land take of 664.5 m^2 and a permanent land take of 1,200 m^2. Configuration 2 has a temporary land take of 1,120 m^2 and a permanent land take of 896 m^2. Land take calculations are based on Configuration 1 because it has the worst case permanent land take. Therefore, during construction the temporary land take per turbine is assumed to be 664.5 m^2 and the permanent land take for the life of the Proposed Wind Farm Development is assumed to be 1,200 m^2. The temporary areas would be reinstated following construction.

4.16 A met mast to be retained for the duration of the consent would be constructed on-site, which would have a concrete foundation of approximately 36 m^2 (6 m x 6 m) (see Figure 4.3: Typical Mast Elevations). There would be a temporary crane pad to facilitate erecting the permanent mast with 150 m^2 (10 m x 15 m) of temporary land take. A permanent communications mast would be erected adjacent to the control building and substation which would have a foundation base of 3 x 3 m. There would be a temporary crane pad to facilitate erection of the communications mast with 18 m^2 of temporary land take. There would also be six guyed temporary met masts each of which would have a temporary land take of approximately 10 $m^{2,}$ not including the area within the guy ropes. The total temporary land take for all 6 masts would be approximately 60 m^2.

4.17 A new track length of 10.3 km is proposed. The running width of the track would be 6 m on straight sections, including shoulders of 0.5m on each side. The track would be wider on bends and junctions and will include permanent turning heads and passing bays. The total land take for the new tracks would be 72,282 m^2. The above figures include land take for the site entrance and turning heads.

4.18 The sub-station compound would take up an area of approximately 4,525 m^2 (62 m x 65 m + 45 m x 11 m). This total area includes the following: The grid connection building is indicatively 498.5 m^2 (12.6 m x 12.7 m + 20.4 m x 16.6 m) and the control building

indicatively 450.4 m^2 (13.9 m x 32.4 m). Stone and/or concrete hard standing areas and plinths would surround the two buildings. This would give a total area of 4,525 m^2 (Figure 4.9: Control Room and Substation Compound Plan).

4.19 The temporary construction compound would require an area of approximately 4,000 m^2 (80 m x 50 m). This area would be re-vegetated after construction is complete. (Figure 5.1: Construction Compound Typical Layout).

4.20 The temporary storage area would require an area of approximately 3,500 m^2 (70 m x 50 m). This area would be re-vegetated after construction is complete.

Table 4.1: Summary of Temporary and Permanent Land Take on the Site

Wind Farm Element	Temporary Land Take[1]	Permanent Land Take[2]
Turbines and transformers	N/A	217 m^2 per turbine = 4340 m^2
Crane pads and lay down areas	664.5 m^2 per turbine = 13,290 m2	1200 m^2 per turbine = 24,000 m^2
Permanent met mast and crane pad	150 m^2	36 m^2
Permanent communications mast and crane pad	18m^2	9m^2
On-site access tracks	N/A	72,282 m^2
Sub-station compound including control building	N/A	4,525 m^2
Construction compound	4,000 m^2	N/A
Temporary storage area	3,500 m^2	N/A
Total land take in square metres	20,958m^2	105,192 m^2
Total land take in hectares	2.10 ha	10.52 ha
Total land take as % of total area within the Site boundary	0.32%	1.58%

4.21 The delivery route to the Site for abnormal load vehicles is from the north, as described under the 'Description of Access' sub-heading in this chapter and as discussed in further detail in **Chapter 14: Access, Traffic and Transport.**

4.22 Delivery of abnormal loads to the Site would require off-site road widening at certain points along the A939 and at the junction of the A96 and A939, as shown in Figure 1.3 and Technical Appendix 14.1). The new site entrance would be direct from the A939 road. Details of delivery routes to the Site are further discussed in **Chapter 14: Access, Traffic and Transport.**

[1] Temporary land take: this refers to ground which will be formed as hardstanding during the construction phase of the proposed wind farm. Once the proposed wind farm has been constructed this land will be available for grazing

[2] Permanent land take: this refers to ground which will be occupied by hardstanding/built structures throughout the lifetime of the proposed wind farm (25 years)

4.23 In summary, within the Site, the Proposed Wind Farm Development would have a land take of approximately 10.52 ha for the life of the project and an estimated further 2.10 ha would be directly disturbed during construction. The total land area of the Site is 666 ha. Therefore, the land take of the Development would be approximately 1.58% of the total land area within the wind farm site boundary. An estimated 0.32% would be directly utilised during construction, on a temporary basis. In addition, approximately 0.083 ha would be disturbed on off-site road improvement works.

Woodland and Scattered Tree Management

4.24 There are four areas classified as woodland on the Site; two small patches of semi-natural broadleaved woodland and two coniferous plantations. See Figure 8.1: Extended Phase 1 Survey Results.

4.25 The two small patches of semi-natural woodland are present along the western boundary of the Site and are typical of the broadleaved habitat in the wider area with a dominance of downy birch *Betula pubescens* over a grass-dominated ground flora. Elsewhere, similar species composition has a fragmented presence as scattered trees, especially alongside surface water movement in the more central parts of the Site. At these locations, the underlying habitat is overriding in terms of classification.

4.26 There is a rectangular area of coniferous plantation in the northwest of the Site which is exclusively Scots pine *Pinus sylvestris*-dominated, and a further area of coniferous plantation in the north east of the Site, which is also exclusively Scots pine *Pinus sylvestris*-dominated. Scots pine presence across the Site is greater than this suggests, with self-seeded remnants of a previously more continuous habitat evidenced in a scattered presence, especially along the eastern boundary of the Site.

4.27 As part of the Proposed Wind Farm Development, some felling and replanting of woodland and scattered trees is proposed. This is in order to accommodate construction of the wind farm footprint, to mitigate potential impacts on bats and to comply with the requirements of wind turbine manufacturer warranties. These requirements are detailed below and are illustrated on Figure 4.12.

4.28 It would be necessary to fell an estimated 0.01 ha of broadleaved woodland, an estimated 0.94 ha of scattered broadleaved trees (predominantly birch) and an estimated 0.92 ha of scattered Scots Pine during the construction of the Proposed Wind Farm Development. This is to accommodate construction of the wind farm footprint (predominantly the construction of turbine T1 and its associated crane pad and access track) and to provide a standoff distance of 80 m between turbines and woodland/scattered tree edges for bats, as recommended in **Chapter 8: Ecology**. The trees to be felled due to the wind farm infrastructure footprint or provision of bat buffers cannot be replanted in situ. To compensate for this, new areas of native birch woodland will be planted to provide screening around both the control building and substation compound and the site entrance. This is shown on Figure 4.12. The total amount of woodland and scattered trees to be felled and not replanted in situ is approximately 1.87 ha and the total amount of new planting at the substation and site

entrance is approximately 2.11 ha. Therefore the overall area of new planting would exceed the overall area of trees to be felled and not replaced.

4.29 Turbine manufacturer warranties include requirements for setback distances between turbines and trees of certain heights in order to prevent adverse effects of turbulence on the turbines over their lifetime. The extent of the setback distance and tree height restriction varies according to the type of turbine installed. Therefore, the exact amount of felling required to meet turbine manufacturer warranties will not be determined until the pre-construction stage when a final turbine choice is made, should consent be granted.

4.30 In order that the effects of tree felling are fully taken into account in this ES, conservative assumptions regarding the setback distances required have been assumed in order to assess the 'worst case'. The most conservative maximum allowable tree height of 6 m has been assumed for Figure 4.12; however tree heights of up to 10 m may be allowable depending on the final turbine used. The felling of trees will be very carefully considered and only performed where necessary once the turbine type has been determined. Figure 4.12 shows the potential areas of woodland (semi-natural birch) and scattered trees (birch and Scots Pine) which may exceed the maximum heights and minimum setback distances required by a turbine manufacturer, at some point during the wind farm's operational life of 25 years. In order to retain the existing trees for as long as possible, rather than felling and replanting the trees all at the same time during construction of the wind farm, the trees will be selectively felled only at a point in time to prevent them exceeding the maximum allowable height. The maximum potential area of felling required to comply with turbine manufacturer warranties is 3.46 ha of broadleaved woodland (predominantly birch), an estimated 2.20 ha of scattered broadleaved trees (predominantly birch) and an estimated 1.56 ha of scattered coniferous trees (predominantly Scots Pine). However, all of this will be replanted in situ with a native species that is already present in the area.

4.31 The trees will be hand cut, and it is proposed that the felled wood will be used as domestic wood fuel in the local area. Any remaining brash will be used to mulch the replanted areas. These proposals have been developed in accordance with the Scottish Government's policy on the Control of Woodland Removal[3]. Tree felling would be undertaken in accordance with the Forest and Water Guidelines[4].

4.32 The effects of the tree felling and replanting are assessed in **Chapter 7: Landscape and Visual**, **Chapter 8: Ecology**, **Chapter 9: Ornithology**, **Chapter 11: Geology, Hydrogeology and Hydrology** and **Technical Appendix 11.1: Carbon Assessment**.

Habitat Management Plan

4.33 An Outline Habitat Management Plan (HMP) has been developed to enhance bog habitats on the Site, which will also benefit Golden Plover, for the life-time of the Project. Further details are provided in Technical Appendix 8.7: Outline Habitat Management Plan.

[3] Forestry Commission Scotland (February 2009): The Scottish Government's Policy on the Control of Woodland Removal.

[4] Forestry Commission (2011) Forests and Water: UK Standard Forestry Guidelines

Description of the Proposed Wind Farm

4.34 The Proposed Wind Farm Development would consist of the following key elements:

Wind Turbines

4.35 The wind turbine industry is evolving at a remarkable rate. Designs continue to improve technically and economically. The most suitable turbine model for a particular location can change with time and therefore a final choice of machine for the Proposed Wind Farm Development has not yet been made. The most suitable machine would be chosen before construction, within the overall height limit of 110 m to tip as assessed in this Environmental Statement.

4.36 For assessment purposes, the most suitable candidate turbine available in the market place, currently of 3 MW nominal capacity and with an overall height to blade tip of 110 m has been assumed. Most of the dominant international wind turbine manufacturers are now producing turbines that are classed as suitable for the wind regimes typical of Scotland and many are also producing turbines that meet the 110 m maximum tip height specification being proposed, ranging from 2 MW to 3 MW in capacity. Exact tower and blade dimensions vary slightly between manufacturers. A diagram of a typical 110 m tip height turbine is given in Figure 4.2: Typical Wind Turbine Elevation. The colour and finish of the wind turbine blades, nacelles and towers would be agreed with the ECDU and is expected to be the subject of a condition of consent. A significant amount of research has been undertaken in relation to turbine colour and finish. SNH (December 2009)[5] states that:

"Selecting the most appropriate colour for a turbine(s) is an important part of detailed wind farm design and mitigation. It has previously been assumed that wind turbines could be painted a colour that would camouflage them against their background. However, experience has shown that no single colour of wind turbine would consistently blend with its background and it is more important to choose a colour that would relate positively to a range of backdrops seen within different views and in different weather conditions".

4.37 The publication goes on to state that as a rule for most rural areas of Scotland:

- a single colour of turbine is generally preferable;
- a light grey colour generally achieves the best balance between minimising visibility and visual impacts when seen against the sky;
- the use of coloured turbines (such as greens, browns or ochres) in an attempt to disguise wind turbines against a backcloth is usually unsuccessful; and
- paint reflection should be minimised.

4.38 Whilst often backclothed in views by topography, the turbines would be seen above the horizon at a number of key viewpoints in close proximity to the Site. In cognisance of the preceding guidance a simple pale grey colour with a semi-matt finish is suggested for the turbines at the Proposed Wind Farm Development.

[5] SNH (December 2009) Siting and Designing wind farms in the Landscape (Version 1)

4.39 Turbines normally rotate clockwise when viewed from the front, although this can vary between models. However, all the turbines would rotate in the same direction. The computerised control system with each turbine continuously monitors the wind direction and instructs the turbine to turn (yaw) to face into the wind to maximise the amount of energy that is captured.

4.40 Turbines begin generating automatically at a wind speed of around 3 to 4 meters per (m/s) and have a shutdown wind speed of around 25 m/s. It is proposed to install infrared lighting on the turbines in a pattern that is acceptable to the Ministry of Defence (MoD) for aviation visibility purposes. Infrared lighting allows military aircraft with night vision capability to detect and avoid the Proposed Wind Farm Development. Infrared lighting cannot be detected with the naked eye, thereby reducing visual impact when compared to lighting for civil aviation purposes.

Turbine Transformers and Switchgear

4.41 Each turbine would have a transformer and switchgear; the scale of these structures in relation to the turbine is illustrated in Figure 4.2: Wind Turbine Elevation. For most current models, the transformer and switchgear is located alongside the base of each turbine, although for larger turbines some manufacturers are installing the transformer in the nacelle or tower base. The transformer's function is to raise the generation voltage from approximately 690 volts (V) to the higher transmission level of 33 kV that is needed to transport the electricity into the grid. Although internal transformers are sometimes possible, it is not a universal feature, therefore the ES has considered external transformers as the option with greater potential environmental effect. However, the possibility of internal transformers will be re-examined should the wind farm be consented, at the pre-construction phase. The transformers and switchgear enclosure would be cement grey / green in colour. The transformer and switchgear enclosure dimensions would be approximately 7 m x 4 m in plan area (including hardstanding) and 3 m in height. The turbine and transformer would be connected by a length of buried cable.

Permanent Wind Monitoring Mast

4.42 For ongoing wind speed monitoring and assessment of the performance of the Proposed Wind Farm Development, a permanent meteorological mast would be required for the duration of its operation. This would be a free-standing (non-guyed), steel lattice model, set into a small concrete base typically 6 m x 6 m and 3 m deep, and would be up to 72 m. Figure 4.3: Typical Mast Elevations shows a typical elevation for a permanent meteorological mast. The proposed location of the wind monitoring mast is shown on Figure 4.1: Infrastructure Layout.

Temporary Wind Monitoring Masts

4.43 Temporary guyed met masts, known as power performance or calibration masts, of up to 72 m height would be erected to confirm the detailed wind flow of the Site. These masts are raised prior to turbine erection and the data they gather is used in the acceptance tests on the turbines. Figure 4.3: Typical Mast Elevations shows an example of a temporary mast.

4.44 Three pairs of masts (six in total) are expected to be required. One mast of each pair would be erected at the turbine location, and the paired mast will be approximately 200 m upwind. The temporary mast locations are shown in Figure 4.1: Infrastructure Layout.

4.45 The masts would be raised around the same time as the turbine foundations are poured, approximately six months before the turbines are erected. After approximately three months, once the mast pairs have been calibrated against each other, the masts at turbine locations would be removed shortly before the turbines at those locations are erected. The remaining three masts would be removed six-eight months into the Proposed Wind Farm Development's operation, once sufficient data across the full range of wind conditions is gathered to prove the performance of the turbines.

Foundations and Crane Hard Standings

4.46 The wind turbines would be sited on steel re-enforced concrete foundations. It is anticipated that these would be of gravity base design. Final base designs would be determined after a full geotechnical evaluation of each turbine site at the pre-construction stage. Figure 4.4: Wind Turbine Foundation gives an illustration of typical wind turbine foundation construction together with the foundation base for an external transformer (as discussed in paragraph 4.30).

4.47 During the erection of the turbines, crane hard-standing areas are required at each turbine base. Typically, these consist of one main permanent area of 896-1200 m^2 adjacent to the turbine position where the main turbine erection crane would be located. The other areas totalling 664.5-1120 m^2 would be temporary and would be used during the assembly of the main crane jib and assembly of the rotor. Figure 4.5: Crane Hardstanding General Arrangement shows the two expected crane hard-standing layouts although only one would be utilised dependent on final turbine supplier requirements. The hardstanding would be constructed using the same method as the excavated access tracks. This involves the topsoil being replaced with hardcore to ground level.

4.48 After construction operations are complete, the temporary crane pad areas shown on Figure 4.5: Crane Hardstanding General Arrangement would be reinstated. There would be a need to use cranes for maintenance from time to time during the operational phase of the Proposed Wind Farm Development, so the main crane hard-standing would be left uncovered to ease maintenance activities. This approach complies with current best practice guidance[6] which recommends crane hardstandings are left uncovered for the lifetime of the Proposed Wind Farm Development.

Site Entrance and Tracks

4.49 The location of the site entrance is shown in Figure 4.1: Infrastructure Layout and was chosen in consultation with THC Roads Department.

[6] http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1618

4.50 Figure 4.6: Site Entrance shows the site entrance in detail. It is proposed that the site entrance will be partially constructed using concrete cellular paving or similar. This will allow the site entrance to be partially re-vegetated following construction of the Proposed Wind Farm Development, whilst retaining the provision for abnormal loads to access the Site during the operational phase.

4.51 The on-site access track layout has been designed to minimise environmental disturbance and land take by following contours and avoiding environmental constraints and sensitive features, where possible. Tracks are proposed to access the various turbine locations and would be a total of approximately 10.3 km in length. Further details on track dimensions are provided in paragraph 4.5

4.52 Typical access track designs are shown in Figure 4.7: Typical Access Track Details. The vast majority of track will be excavated however it is considered likely that short lengths of floating tracks will be required at some locations on the Site due to the presence of discrete areas of deeper peat.

4.53 The design of the Proposed Wind Farm Development has avoided crossing natural water courses.

4.54 Further details on the on-site tracks are provided in **Chapter 5: Construction and Decommissioning.**

Underground Cabling and Electrical Connection

4.55 Assuming the use of currently available models, each wind turbine would generate electricity at 690 V and would have its own transformer located either adjacent to, or within, the base of the tower to step up the voltage to the on-site distribution voltage of 33 kV. Each turbine would be connected to the sub-station by underground cable buried below ploughing depth. Typical cable trenches are shown in Figure 4.8: Cable Trench Typical Sections.

4.56 The on-site substation is proposed to be located in the western area of the Site, as shown in Figure 4.1: Infrastructure Layout. The sub-station is described in greater detail below.

4.57 The point of connection for the Proposed Wind Farm Development into the grid system is currently unknown and a number of options are being explored. At an appropriate time, the Applicant will apply to the relevant network operator (Scottish Hydroelectric Power Distribution or Scottish Hydro Electric Transmission) for permission to connect to the network. It is the responsibility of the network operator to progress the relevant consent for connection to the grid. The distribution/transmission licence holder's application would assess the environmental effects of the proposed connection route alone and in combination with the Proposed Wind Farm Development.

On Site Sub-station and Control Building

4.58 The substation is shown in Figure 4.9: Control Room and Substation Compound Plan and Figure 4.10: Control Room and Substation Compound Elevation. The sub-station compound would contain power quality improvement equipment, up to two auxiliary transformers, and possibly a spare turbine transformer. The control building required at the sub-station would accommodate metering equipment, switchgear, the central computer system and electrical control panels. A spare parts store room, toilet and wash basin along with a kitchenette would also be located in the control building. Although not permanently staffed, the buildings would be visited regularly by maintenance personnel. There is no requirement for any other permanent buildings on the Site. As it has yet to be determined whether the Proposed Wind Farm Development will connect to the electricity network via the distribution or transmission network, the substation compound has been designed to allow for the larger footprint required for a transmission connection. Should a distribution connection be selected, the size of the substation compound will be reduced. From the Applicant's previous recent experience, it has been assumed that the network operator grid connection transformer equipment will be enclosed inside a grid connection building for weather protection, however this requirement will be reviewed with the network operator as the final grid connection method is determined. Tree planting is proposed to help screen the substation compound, as shown on Figure 4.12. The finish and colour of the building will be agreed through consultation, and will be deigned to integrate the building with the local vernacular style where possible.

4.59 A maximum 10 m high free-standing communications mast would be located adjacent to the substation compound and a typical elevation is shown in Figure 4.3: Typical Mast Elevations.

4.60 Rain water would be collected from the roof of the control building via a modified drain pipe system into a storage tank located either within the toilet area, roof space of the control building, or an external buried tank. An overflow from the tank would drain to the outside of the building into a rainwater soakaway.

4.61 The storage tank would supply;

- Raw/untreated rainwater to the toilet; and
- Rainwater via a UV filter to the hand basin.

4.62 Additional water sources would be considered and any abstractions would comply with the Controlled Activities Regulations (CAR) guidelines[7].

4.63 Following an assessment of foul treatment options through a review of Pollution Prevention Guidelines 4, it was determined that the toilet, wash hand basin and sink should drain to a small package treatment plant located adjacent to the Control Building, which would follow the CAR guidelines and be constructed and located in accordance with the relevant Building Standards and agreed with ECDU.

4.64 Further details on the construction of the Site sub-station and control building are given in **Chapter 5: Construction and Decommissioning**.

[7] SEPA 2011. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 – A Practical Guide

Description of Access Options

4.65 Two principal northern access routes are proposed, both of which are considered feasible to be used for the general construction traffic (see Figure 14.3: Construction Traffic Routes):

- Route 1 – Approach from the west of Nairn along the A96 before joining the A939 in Nairn and following southwards to the site entrance;
- Route 2 – Approach from the east of Nairn along the A96 before joining the A939 in Nairn and following southwards to the site entrance.

4.66 The route for abnormal loads is shown in Figure 14.4: Abnormal Loads Route. The route departs from the Port of Inverness and continues north east on Longman Drive/Stadium Road. The route continues under the Kessock Bridge heading south east on East Longman to the Longman Roundabout. The route turns left at the Longman Roundabout and continues along the A9 to Raigmore Interchange. The route turns left onto the A96 and continues eastbound through Nairn to the junction with the A939. The route turns right and continues southbound along the A939 to the site entrance.

4.67 Figure 1.3 shows the two areas along the abnormal loads route that will require substantive widening works to facilitate overrun by the abnormal load vehicles.

- Widening 1: A96 / A939 Junction (Detail D in Appendix 14.1) - The tracking assessment illustrates approximately 87 m^2 of widening required to accommodate the anticipated vehicles with approximately 77 m^2 of vehicle/load oversail beyond this, all within Transport Scotland land to the north east of the A96 on approach to the junction. The estimated widening/oversail avoids impacting on the bridge structure.
- Widening 2: A939 Approach to Logie Bridge (Detail M in Appendix 14.1) -The assessment has been completed to avoid any impact on the bridge structure. Approximately 59 m^2 of highways widening works, 80 m^2 of third-party widening works, 4m^2 of vehicle/load oversail within the adjacent verge and approximately 31 m^2 of vehicle/load oversail into third-party land will be required. Excavation and reinforcement of the adjacent land is required and vegetation will need to be removed. The widening works also allow the vehicles/loads to avoid an impact on adjacent street furniture i.e. signs and traffic signal infrastructure.

4.68 Appendix 14.1 shows a swept path analysis of all points along the abnormal loads route that involve either overrun or oversail of turbine components beyond the edge of the road. The potential environmental effects (e.g. hydrology, archaeology and ecology) associated with the road improvement works are considered in **Chapter 14: Access, Traffic and Transport**.

4.69 All of the approach routes have been assessed as being feasible options within this ES. Further details on access routes for construction traffic and abnormal loads are discussed in **Chapter 14: Access, Traffic and Transport.**

Operation and Management of the Wind Farm

Life of the Project

4.70 The expected operational life of the Proposed Wind Farm Development is 25 years from the date of commissioning. At the end of this period, a decision would be made as to whether to refurbish, remove, or replace the turbines. The proposed approach to decommissioning is detailed in **Chapter 5: Construction and Decommissioning**. Refurbishment or replacement of the turbines would require a separate consent.

Maintenance Programme

4.71 Wind turbines and wind farms are designed to operate largely unattended. Each turbine at the Proposed Wind Farm Development would be fitted with an automatic system designed to supervise and control a number of parameters to ensure proper performance (e.g. start-up and shut-down, rotor direction, blade angles etc.) and to monitor condition (e.g. generator temperature). The control system would automatically shut the turbine down should the need arise. Sometimes the turbines would re-start automatically (if the shutdown had been for high winds or if the grid voltage had fluctuated out of range), but other shut-downs (e.g. generator over temperature) would require investigation and manual restart.

4.72 The Proposed Wind Farm Development itself would have a sophisticated overall Supervisory Control and Data Acquisition system (SCADA) that would continually interrogate each of the turbines and the high voltage (HV) connection. It a fault was to develop which required an operator to intervene then the SCADA system would make contact with duty staff via a mobile messaging system. The supervisory control system can be interrogated remotely. The SCADA system would have a feature to allow a remote operator to shut down one or all of the wind turbines.

4.73 An operator would be employed to monitor the turbines, largely through remote routine interrogation of the SCADA system. The operator would also look after the day-to-day logistical supervision of the Proposed Wind Farm Development wind farm and would be on-site intermittently.

4.74 It is likely that a local person would be employed to regularly inspect the Proposed Wind Farm Development. Vacancies would be advertised in the local press and full training would be given.

4.75 Although not permanently staffed, the buildings would be visited regularly by maintenance personnel.

4.76 Routine maintenance of the turbines would be carried out approximately twice a year. This would not involve any large machinery or large vehicles.

4.77 If a fault should occur the operator would diagnose the cause. If repair warranted the Proposed Wind Farm Development being disconnected from the grid then the operator would make contact with SSE. However, this is a highly unlikely occurrence as most fault repairs

can be rectified without reference to the network utility. If the fault was in the electrical system then the faulty part or the entire wind farm would be automatically disconnected.

4.78 A sign would be placed at the Site entrance giving details of emergency contacts. This information would also be made available to the local police station and SSE.

Operational Management

Health and Safety

4.79 This section describes the potential health and safety issues relating to the operation of the Proposed Wind Farm Development. The paragraphs below outline the procedures that would be put in place and followed to ensure the health and safety of the workforce and the public, specifically in relation to the following:

- turbine safety;
- safe operation;
- safety during adverse weather conditions;
- public safety; and
- shadow flicker.

4.80 Since its first schemes were constructed in 1992, the Applicant has an excellent track record of safe operation and maintenance of wind farms across the UK and elsewhere, and ensures safe, prudent and cost effective long-term operation of its plant. The Applicant manages and operates a range of wind farms that have been developed and constructed by the Applicant, and also manages wind farms for other owners, to the highest international safety and environmental standards.

4.81 As for any mechanical or electrical installation, wind farms could pose a safety risk if not managed and maintained correctly. Under the Construction (Design and Management) Regulations 2007, detailed risk analysis and avoidance limitation measures are required for every facet of the development and operation of a wind farm. These measures would be contained in the Health and Safety file for the Proposed Wind Farm Development, which would be open to inspection by the Health and Safety Executive. All Site personnel would have full safety training, to ensure a minimal risk of accidents occurring.

4.82 Safety of its staff and of the public is of paramount importance to the Applicant. During construction and subsequent operation of the Proposed Wind Farm Development, Site safety procedures would be strictly enforced and followed. All work on-site would comply with:

- The Construction (Design and Management) Regulations 2007 (HSE, 2007);
- The Health and Safety at Work Act 1975 (HMSO, 1974); and
- The Construction (Health, Safety and Welfare) Regulations 1996 (HMSO, 1996).

4.83 This would be done in conjunction with;

- The revised edition of the Renewable UK Health and Safety in the Wind Energy Industry Guidelines; and
- The Management of Health and Safety at Work Regulations 1999 (HMSO, 1996).

Turbine Safety

4.84 The Applicant would require the selected wind turbine model to have full certification from a recognised authority against internationally recognised standards, and to have a proven track record of safe operation. The main certification agencies, such as Germanischer Lloyd, have well developed and proven certification procedures. In addition, a mature suite of safety and testing standards, developed over many years by the International electrochemical Commission, are now in place and are widely accepted. Working in parallel, these standards and certification procedures have ensured that wind turbines enjoy high levels of intrinsic safety.

4.85 As stated on the Scottish Government's web-based renewables advice[8] "*Danger to human or animal life from falling parts or ice is rare…*" The highest risk of damage is in extreme wind speed conditions (>100 mph) when the likelihood of anyone being on-site is remote. Even under these conditions the risk of damage is small (for example, the Wigton wind farm in Jamaica which the Applicant constructed and commissioned in 2004 was left undamaged by Hurricane Ivan which caused devastation throughout the island on 10 September later that year). The turbines proposed for the Proposed Wind Farm Development would be certified to withstand appropriately extreme conditions. In very high winds the rotors of wind turbines are braked (i.e. the rotors are stopped) and are parked in a safe position.

Safe Operation

4.86 Modern wind turbines incorporate supervisory control systems that continually interrogate the operational status and safe working of key components of each turbine and allow an operator to remotely monitor the turbines via modem. Under fault conditions, affect turbines automatically shut down and send an alarm to the maintenance engineer. For safety-critical faults, turbines do not re-start until the maintenance engineer has diagnosed and rectified the problem.

4.87 In terms of general safety during operation, the turbines would be supported by the manufacturer's operational and maintenance safety manuals, which would be available on-site supplementing the Applicant's safety manuals and procedures. These manuals would form the basis of the regular safety checks that would be undertaken throughout the life of the Proposed Wind Farm Development.

4.88 The Applicant has developed its own wind farm safety manual, which would be adhered to throughout the lifetime of the wind farm. The Proposed Wind Farm Development, in compliance with relevant safety regulations, would display appropriate warning signs concerning restricted areas on the turbines, sub-station enclosure and control building. Authorised personnel and persons under their supervision who visit the restricted areas of the Site during its operation would operate under site-specific safety rules established by the

[8] http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables

owner and operator. Electrical installation would be to standards and recognised codes of practice with adequate signage and protection.

Safety during Adverse Weather Conditions

4.89 Although the possibility of attracting lightning strikes applies to all tall structures, wind turbines have specific protection requirements due to their size and nature. Specific design features are required to ensure safety and to ensure that the turbines can operate through lightning storms without damage and without impact on reliability. Specific features are incorporated into the blades to ensure strikes are conducted harmlessly past the sensitive parts of the nacelle and down the tower into the earth. Protection also includes a buried earthing mat around each turbine foundation and/or a lightning conduction cable which is sunk to a substantial depth into the earth, sufficient to ensure appropriate conduction to ground.

4.90 In some countries, icing of wind turbine blades presents a potential risk that must be managed. In the warmer climates of the UK, icing has not been a problem to date, but at higher elevations and at locations further north, the risk would be greater and needs to be suitably assessed.

4.91 Generally, there is no inherent danger in operating a wind turbine at low temperatures, and there is no particular risk simply because it is frosty or snowing. However under certain atmospheric conditions, such as freezing-fog which specifically involves low temperature and high humidity, hard ice can form on the blades (this can also happen either when rain freezes on contact with a blade or should the turbine be operating in low cloud). If action is not taken to shut the turbine down then a build-up of ice, ultimately resulting in ice-throw, might happen.

4.92 At locations where icing risk is higher, automatic shut-down systems and operations re-start protocols can be put in place to ensure that icing events do not turn into hazards. RES has developed and implemented such measures at other wind farms.

4.93 Given the location of the Proposed Wind Farm Development such conditions would be very rare and it is not considered that icing represents a significant risk.

Public Safety

4.94 After construction is completed, there would be no reason under normal circumstances to restrict access to the operating wind farm for public safety reasons. Current access arrangements to the Site would therefore not change substantially, albeit that improved access has the likelihood of generating additional visitor numbers than the current land-use.

4.95 As for any structure, storm damage to turbines can be sustained during severe events. A few isolated cases of turbine blade damage have occurred in exceptionally high wind conditions.

4.96 The plant, equipment and their enclosures are designed to incorporate appropriate modern technology and access to the Proposed Wind Farm Development should pose no danger to the public. During routine maintenance operations 'warning men at work' signs would be erected.

4.97 At the main entrance to the Site, signs would be deployed giving basic safety information including speed limits, appropriate personal protective equipment and also giving details of whom to contact in an emergency. Emergency contact information would also be posted at the local police station and with the local power company, SSE.

Shadow Flicker

4.98 The results of the shadow flicker and reflected light assessments conclude that the Proposed Wind Farm Development would not cause a material reduction to residential amenity owing to either of these potential impacts. Therefore, no mitigation measures are proposed. This issue is discussed in further detail in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker.**

Description of Operation Residues & Emissions

Air

4.99 Due to the nature of the Proposed Wind Farm Development no significant point source air emissions would be produced during its operation. The Proposed Wind Farm Development would generate renewable electricity and would therefore displace CO_2 emissions associated with electricity generation which would otherwise be supplied via other forms of power generation requiring the combustion of fossil fuels. To assess if a full life cycle assessment of carbon losses and gains throughout the wind farm manufacture and construction was required, the Scottish Government Carbon Calculator for Wind Farm on Peatlands was consulted. The results of this assessment are contained in Technical Appendix 11.1 and indicate that the Proposed Wind Farm Development will have an expected payback period of 1.0 years and will save an estimated 83,907 tCO_2/yr over its 25-year lifespan, compared to fossil fuel mix of electricity generation.

Water

4.100 Approximately 10.52 ha (1.58%) of the Site area would be covered with semi-permeable and impermeable surfaces. The great majority of these surfaces comprise Site tracks which are semi-permeable and would act in a similar manner to a SuDS, allowing some infiltration of storm water through the track surface, and there would be a trackside drainage system installed during construction. Figure 4.11 illustrates typical SuDS features. Runoff from areas of impermeable hardstanding such as concrete paths and foundations is expected to infiltrate locally on unsurfaced areas. Water quality monitoring during the operational phase would allow early detection of potential pollution incidents and assurance as to the ongoing performance of the SuDS. Further details are provided in **Chapter 5: Construction and Decommissioning and Chapter 11: Geology, Hydrogeology and Hydrology.**

Waste

4.101 The power generation aspect of the Proposed Wind Farm Development would not produce any waste emissions or pollutants. However the general operation and maintenance of the Proposed Wind Farm Development has the potential to produce a small amount of waste. This is likely to be restricted to waste associated with the control building from employees and visiting contractors and the storage of oils and lubricants.

Noise

4.102 The wind turbines would generate noise during operation, and the noise levels would vary according to the wind speed. The location of residential receptors in relation to the Proposed Wind Farm Development was one of the key design constraints in the design development process and the predicted noise levels are within acceptable limits. Full details of the noise impact assessment are present in **Chapter 12: Noise**.

Light

4.103 As reported in **Chapter 13: Electromagnetic Interference, Shadow Flicker and Aviation,** Shadow Flicker is not expected to have any significant effects. In addition, the infrared lighting proposed at the hub on each turbine for aviation visibility purposes would not be visible to the naked eye, which is also discussed in **Chapter 13: Electromagnetic Interference, Shadow Flicker and Aviation**. The substation buildings are likely to be equipped with Passive infra-red controlled security lighting (as shown on Fig 4.10). These will illuminate the sub-station compound area when activated. Any effect will be temporary and not expected to be significant during normal operation of the development.

5 Construction and Decommissioning

Introduction

5.1 Impacts arising during the construction and decommissioning process are temporary, generally short-term and intermittent. Nevertheless, they can be sources of potentially significant impact on environmental resources and residential amenity. This chapter describes the proposed programme of site preparation, construction and decommissioning works for the Site and the key activities that will be undertaken during the works to inform the identification and assessment of potential environmental impacts set out in the technical chapters. This chapter also describes the management controls that will be implemented during the site preparation, construction and decommissioning phases to control potential environmental impacts.

5.2 Construction impacts are inherently difficult to predict with any certainty as they are dependent on the specific nature of construction activities and vary depending on the stage of construction. Much depends on precisely what activities are taking place and at what locations. Prevailing weather conditions can also have a strong influence on the significance of effects arising from the impacts identified.

5.3 Given these uncertainties, the approach taken in the EIA is to describe the principal activities that will occur during the construction phase, and demonstrate how environmental impacts will be controlled / mitigated by the adoption of specific policies, procedures and controls contained within construction management plans. A Draft Construction and Decommissioning Method Statement (CDMS) is presented as **Technical Appendix 5.1.**

Construction Programme

5.4 The estimated duration of the construction of the Proposed Wind Farm Development is approximately 28 months, which is considered appropriate for construction of a 20 turbine project, substation and commissioning works. This period is somewhat weather dependent and could be affected by ground conditions found at the Site.

5.5 The envisaged sequence of key events for the construction programme would be:

- undertake improvement works to the public highway including widening works in 3rd party ownership[1];
- construct the Site entrance and new access track to the position of the temporary construction compound and construct the compound;
- construct the Site access tracks with field gates and temporary fencing (where required) and excavate the foundations;
- construct the wind turbine foundations;
- construct the sub-station;
- excavate the trenches and lay the power and instrumentation cables;
- erect the turbines;
- commission the turbines; and
- carry out land reinstatement, remove temporary Site office, reinstate temporary compound and other temporary hardstanding areas and clear the Site.

5.6 The timing of commencement of construction of the Proposed Wind Farm Development would be dependent upon:

- timing of the discharge of suspensive pre-commencement conditions of consent, should the application for Section 36 consent be successful;
- ongoing estate activity; and
- weather, ground conditions and ecological factors.

Construction and Contracting Strategy

5.7 The civil and electrical sub-contracts would be tendered to a number of pre-qualified companies who meet with the stringent Applicant requirements for sub-contractors based on performance, H&S and environmental issues.

5.8 Local sub-contractors would be encouraged to tender for contracts.

Construction Employment

5.9 During construction there would be a temporary workforce varying between 10 and 50 people over a period of approximately 28 months. Based on analysis of their wind farm developments between 2010-2013, the Applicant estimates that a temporary workforce of up to 36 staff would be created during the 28 month construction stage of the Proposed Wind Farm Development, based on a 60 MW scheme. As for all of the Applicant's construction projects elsewhere in Scotland, local contractors would be used where reasonably practicable.

Hours of Work

5.10 It is proposed that construction and civil works would be restricted from 7 am to 7 pm (Monday to Saturday). However construction activities would be confined to the above days of the week and hours of working would be agreed with the Planning Authority (THC) prior to the commencement of construction. This could be secured by a suspensive condition of consent.

[1] Road upgrades may be carried out either before or at any time during the wind farm construction period

5.11 Any extensions to working hours would be agreed in advance with the Planning Authority (THC).

5.12 During turbine erection, the Applicant would request permission to work a seven day week. Erection would span 22 weeks towards the end of the construction phase. The reason for this extended working proposal is that erection is weather dependant, and additionally, turbine erection cannot be stopped half way through the construction process because the turbines need to be fully erected to be made wholly safe. A seven day working week would enable this to be achieved. The turbine supplier would want to work through the hours of daylight in the summer and up to 12 hours a day in winter. Noise levels associated with turbine erection are minimal, as discussed in **Chapter 12: Noise**.

Construction Traffic and Plant

5.13 In addition to staff transport movements, construction traffic would consist of heavy goods vehicles (HGVs) and abnormal load deliveries.

5.14 As outlined in **Chapter 14: Access, Traffic and Transport**, the worst case peak traffic will occur in month nine of the construction programme and will result on average in 144 additional movements on the road network per day (72 trips inbound and 72 outbound from the site). Of these 96 will be HGV and the remaining 48 will be made up of cars, light vehicles and 4x4s. This equates to an average hourly increase of traffic of 18 movements per hour (assuming an eight hour working day).

5.15 Approximately 160 abnormal load deliveries transporting the turbine components would be generated during the turbine erection stage, with convoys of up to three deliveries per day. The actual number of abnormal loads is dependent upon the model of turbine selected and would be confirmed in the development of the traffic management plan which would be written in consultation with THC, post-consent.

5.16 Turbine component delivery loads would be supervised during their transportation using appropriate steerable, hydraulic and modular trailer equipment where this is required. Axle loads would be appropriate to the roads and access tracks to be used. The transportation of turbine components would be conducted in agreement with the relevant Roads Authorities and local police. The Applicant would notify the police of the movement of abnormal length (e.g. turbine blade delivery) and abnormal weight (e.g. crane) vehicles and obtain authorisation from Transport Scotland and THC prior to any abnormal vehicle movements.

5.17 Police escorts would be used, and the appropriate permits obtained, for the transportation of abnormal loads to ensure that other traffic is aware of the presence of large, slow moving vehicles. Where long vehicles would have to use the wrong side of the carriageway or need to swing into the path of oncoming vehicles, a lead warning vehicle would be used and escort vehicles would drive ahead and stop oncoming traffic. Vehicles would also be marked as long/abnormal loads. For return journeys, the extendible low loaders used for wind turbine delivery would be retracted to ensure they leave the Site with a trailer length of no more than 16 m.

5.18 The local community will be given advance notification of the abnormal loads delivery period and roads affected.

5.19 A description of the proposed access routes for both general construction traffic and abnormal loads is summarised in **Chapter 4: Description of Development** and discussed in detail in **Chapter 14: Access. Traffic and Transport**.

Description of Construction Works

5.20 In this section descriptions are given of the civil engineering elements, their design features and their construction processes. The descriptions cover access upgrades, on-site tracks, turbine foundations, permanent met mast and temporary features such as the construction compound and temporary met masts. Also described is the turbine deployment.

Main Road Access and Site Entrances

5.21 The Site will be accessed from a newly created entrance on the A939, which forms the western boundary of the Site, at approximately NH 974424. It is anticipated that all construction traffic will access the Site from the north and the proposed Site entrance will take the form of a simple priority junction designed to accommodate the movement of all development-related traffic, including the abnormal load vehicles. To permit the drivers to make the required manoeuvre safely, it is essential that they have unobstructed visibility. In accordance with The Highland Council (2010) *Draft Roads and Transport Guidelines for New Developments*, the access is located on level ground, with a gradient less than 6%. The bell-mouth exit is shown in Figure 4.6: Site Entrance.

5.22 Improvement works and road widening on local roads would be required at two locations in order to accommodate abnormal loads: the approach to the A96/A939 junction; and on the A939 on the approach to Logie Bridge. These proposed locations are shown on Figure 1.3: Road Widening Boundary.

On-Site Access Tracks – Design

5.23 On the Proposed Wind Farm Development, the track layout has been optimised to reduce total track lengths, visual impact and environmental disturbance. Figure 4.1 shows the on-site track layout and Figure 4.7 shows cross-sections of typical track types. The overall length of the access track is approximately 10,300 m, the majority of which would be new, excavated track whilst sections of floating track may be constructed over deeper peat.

5.24 The tracks would permit access by construction vehicles and are required throughout the life of the Proposed Wind Farm Development for maintenance vehicles.

5.25 As explained in **Chapter 3: Design Evolution and Alternatives**, through the design evolution process the final layout of the wind farm components, including the access tracks, has been designed to avoid sensitive ecological, archaeological and hydrological areas where possible. Areas of soft ground would generally be avoided. The movement of heavy construction vehicles on the Site may cause some localised soil compaction; however, the effect of this is considered negligible since most construction work would be carried out from the Site access

tracks. Any off-track movements would occur in a very local context, thus any negative effects are not considered significant.

5.26 Initial site investigations indicate that tracks could be founded to a typical depth of 2000 mm beneath the ground surface. Based on this, excavated or 'cut' track construction is likely to be possible over most of the Site.

5.27 In certain ground conditions, tracks may also be of a 'floating' design i.e. in peat depths over 1.5 m. This would avoid excavating excessive quantities of peat and interrupting the drainage paths in the area. It has been estimated on a preliminary basis that due to avoidance of deeper peat areas in the layout design, up to 98 % of the track length could be 'cut' and only 2% of the roads would be 'floated'. However, the detailed design of the access tracks and the selection of the construction method would only be carried out after a detailed site investigation, prior to construction. More information regarding track construction on peat is provided below.

5.28 The access tracks would have a running surface width of 5 m, with local widening on bends, at passing bays and around turbine bases. The tracks would have shoulders each side of up to 0.5 m giving a total track width of 6 m. They would be constructed of crushed and graded stone giving a 'less-engineered' farm-track appearance. The Applicant would, where practicable, use materials such as road stone and concrete from local quarries and suppliers to minimise transportation requirements. A stone thickness of approximately 300 mm to 500 mm, dependent on construction method and ground conditions, would be used. The Applicant has calculated that approximately 61,129 cubic metres of imported stone would be required.

Peat Slide, Erosion and Compaction

5.29 The Site is overlain by a combination of peat and mineral soils; the peat soils are located across 96% of the entire Site with a varying degree of saturation. The remainder of the Site is overlain by mineral soils of varying depths.

5.30 Initial peat probing investigations were carried out in February and June 2012, as described in Technical Appendix 8.3. Peat depths and data on the condition of the blanket mire were collected at 692 sample points located on a 100 m^2 systematic grid across the survey area. The initial peat depth surveys confirmed that the peat coverage at these samples points varied between less than 0.2 m to 5.15 m depth, with 74% of the total probes recording peat of less than 1.0 m depth, and 13% of the peat probes undertaken recording peat depths of greater than 2.0 m. The deepest area of peat is concentrated in a band towards the southwest of the survey area, and outwith the development areas.

5.31 Further, more detailed peat probing was carried out in April 2013, following confirmation of the proposed infrastructure locations. Peat depths were recorded at 50 m intervals along proposed track/road locations using 10 m right angled offsets, in accordance with Scottish Government guidance[2]. The results of this exercise confirmed that peat sampled across the Site were generally shallow, dry and fibrous in nature showing signs of little decomposition. Overall the peat has been largely affected by practices such as drainage, grazing and both historical and contemporary peat cutting. The area identified for the infrastructure typically has a peat depth of less than 1.5 m. However, the precise depth of peat at infrastructure locations will be confirmed by a detailed site investigation which would typically occur post-consent.

5.32 The slope angles for the Site are shown on Figure 11.3. It can be seen from this figure that the slope angles are typically in the range 0 to 8% gradient, though some tracks may occasionally need to cross steeper slope gradients (up to 12.5% gradient). Tracks have been designed in accordance with best practice guidance[3], which recommends that maximum gradient for wind farm tracks should be between 8% and 10%, with short lengths (less than 200 metres) at 12.5%, provided the average gradient of the track as a whole does not exceed 10%. The average gradient of on-site tracks is in the region of 4-5%.

5.33 A Qualitative Risk Assessment (QRA) was undertaken to determine the baseline peat stability conditions in areas of proposed infrastructure. The baseline assessment found that the risk of peat slide events occurring is classified as Very Low to Low. The Peat Stability Risk Assessment report is included in **Technical Appendix 5.4**.

On-Site Access Tracks – Construction Method

5.34 In areas of peat and topsoil less than 1.5 m thick, the vegetation and soil would be stripped to the subsoil. This forms a cut batter on either side. The cut batter would have an angle of 30 degrees or less, designed to hold a peat turf cover following re-instatement. The track (300-500 mm thick) would be constructed on the subsoil. Approximately 100-150 mm of the upper topsoil layer, together with turves, would be stored separately from the rest of the subsoil in piles adjacent to, or near the tracks for later reinstatement.

5.35 Once the soil has been removed, as described above, to a suitable founding layer, the road and running surface would be constructed by tipping and compacting imported stone to the required shape and thickness. Cross-sections of the final road shape can be seen in Figure 4.7.

5.36 As described above, the Site slopes gently down from the summit of Cairn Duhie although short sections of tracks may cross steeper sections. These sections would correspond to that shown as 'sloping ground section' in Figure 4.7 and would have a ditch only on the up-slope side. The down-slope side would follow the existing slope rather than rising back up as shown on the 'cut track section'.

5.37 In the event that a track is required to cross an area of peat and topsoil greater than 1.5 m thick, a 'floating road' construction would be used. A layer of geotextile reinforcement would be placed directly onto the route of the track. The track would then be built up on the

[2] Scottish Government (2011) Guidance: Developments On Peatland: Site Surveys
[3] Scottish Natural Heritage (2005). Constructed tracks in the Scottish Uplands

geotextile by laying and compacting crushed rock up to a thickness of approximately 500-1000 mm, the exact depth being dependant on ground conditions (see Figure 4.7: Typical Access Track Details). The use of floating roads in areas of deeper peat eliminates the need for excavation and minimises effects on ecology and disruption to existing hydrological pathways and allows for some filtration. Ongoing maintenance will potentially be required to address settling.

5.38 The final appearance results from the reinstatement of the roadside slopes by replacing the layers of excavated material in the correct order. The road surface and ditches would be left clear. The final cross-section would be similar to those shown in Figure 4.7.

On-Site Access Tracks – Drainage (SuDS)

5.39 The drainage strategy has been designed using a SuDS philosophy, as detailed within **Technical Appendix 11.3 SuDS Design Statement**. The tracks would be constructed with sufficient drainage channels to prevent erosion of the road structure. Water running down the channels would be intercepted and diverted onto the surrounding vegetation for the natural filtering of any silt that might be suspended. Positive drainage into existing streams would be prohibited.

5.40 The proposed on-site access tracks will require no new watercourse crossings. However a number of artificial land drains would be crossed by the junction and access tracks between Turbines 5, 4 and 1.

5.41 The access tracks would be designed to allow the efficient drainage of rainwater. Where possible tracks would be laid along contours thus interrupting natural run off and cutting field drains. When this occurs field drains would be piped directly under the track through appropriately sized drainage pipes. Where appropriate, a lateral drainage ditch would be cut along the uphill side of the track to intercept the natural run off. This lateral drain would be drained under the track at regular intervals through correctly sized cross drains. In these cases, the cross drainage pipes would outfall into a drainage ditch cut directly downhill at minimum slope until the bottom of the ditch reaches ground level. Water would then flow out of the end of the ditch onto the hillside, through a soak-away, so transferring the natural run off through the track.

5.42 Where appropriate a second lateral drainage ditch on the other side of the road would catch runoff from the track itself. This lateral ditch would also outfall into the drainage ditches cut directly downhill from the cross drains. Any material washed off the track surface would be removed through natural filtration before reaching any watercourse.

5.43 In cases where the tracks must run significantly downhill, transverse drains would be constructed, where appropriate, in the surface of the tracks to divert any runoff down the road into the drainage ditch.

5.44 Mitigation measures to minimise the hydrological effect of constructing the access tracks have been proposed in **Chapter 11: Geology, Hydrology and Hydrogeology** of this ES and the Draft Construction and Decommissioning Method Statement in **Technical Appendix 5.1**.

Crane Hard Standings

5.45 During the erection of the turbines, crane hard-standing areas are required at each turbine base. Typically, these consist of one main area of approximately 1,200 m^2 adjacent to the turbine position where the main turbine erection crane would be located. The other areas totalling approximately 664.5 m^2 per turbine would be temporary and would be used during the assembly of the main crane jib and assembly of the rotor. Figure 4.5: Crane Hardstanding General Arrangement shows the two potential crane hard-standing layout configurations. The hard-standing would be constructed using the same method as the excavated access tracks. This involves the topsoil being replaced with hardcore to ground level. The final position of the hardstanding would be decided at the pre-construction stage based on a number of considerations including; size of crane required, depth of excavation required, hydrological/ ecological features in the vicinity, local topography (it is preferable to position the crane hard-standing on the same level, or higher level to the turbine foundation level since this eases the lifting operations.)

5.46 After construction operations are complete, the temporary areas shown on Figure 4.5 shall be reinstated. From time to time during the operational phase of the Proposed Wind Farm Development there would be a need to use cranes for activities such as turbine maintenance. The Good Practice during Wind Farm Construction[4] guide recommends that crane hardstanding areas are not covered with peat or topsoil. Therefore, the permanent parts of the crane pads will be left uncovered, which will ease maintenance activities.

Foundations

5.47 It is anticipated that the foundations for the turbine and the external transformer[5] (Figure 4.4: Wind Turbine Foundation) would be of gravity base design. Excavation of the rock at the Site is likely to require tools mounted with rock picks together with hydraulic breaking equipment.

5.48 For a typical 3 MW machine the foundation would characteristically comprise around 300 m^3 of concrete reinforced by 50 tonnes of steel bar, in a tapered octagonal block of approximately 16 m diameter and from 1.5-3.5 m depth, (see Figure 4.4). Each turbine base would require a maximum of 50 concrete deliveries (based on 6 m^3 of concrete in a truck), which would be brought to the Site by local ready mix suppliers. **Depending on the detailed design arrangement each base would be either completed as a single pour over the course of a day or split into two separate pours**

5.49 The foundation surface lies approximately 1.5 m below the normal ground surface and is back filled with soil and reinstated. The foundation plinth would protrude from the ground up to 0.15 m. Approximately 1,200 m^3 of material would be excavated for each turbine base. All of the rock and most of the excavated material is placed back on top of the foundations.

[4] SNH, Scottish Renewables, SEPA and the Forestry Commission Scotland (2010) *Good Practice during Wind Farm Construction*

[5] As described in Chapter 4: Description of Development the use of an internal or external transformer will be dependent on the make of turbine installed on site. An external transformer is described in this section as it presents a worst-case scenario. If an internal transformer is used then the land take for the foundations would be less.

Within these areas, any excess material would be layered into the contours of the existing topography and re-seeded if required.

5.50 The exact quantities of concrete, reinforcement, diameters and depths would vary depending on the actual make of turbine used. Different turbine foundations may also be considered for different turbine locations depending on the local ground conditions. In the development of the foundation, geo-technical tests are carried out to determine the strength of the soil layers beneath the turbines, and the soil behaviour under loading over time. This information is used to produce the foundation design into which are also incorporated factors of safety. The foundation design will be finalised at the pre-construction stage.

5.51 The code of practice for concrete design, BS EN206:1:2000 Concrete Part 1: *Specification, performance, production and conformity* and BS8500-1:2006 Concrete - Complementary British Standard to BS EN 206-1 Part 1: *Method of specifying and guidance for the specifier*, provides a specification for the required resistance of concrete to sulphate attack. This ensures that when constructing in areas of acidic groundwater, the concrete mix is designed to withstand sulphate attack. It is therefore likely that the rate of alkaline leaching would be low, and would not be expected to have a significant effect on the local soil or groundwater conditions. The concrete used would be specified for Class 2 sulphate conditions in accordance with the above code of practice, as this is appropriate for mildly acidic groundwater.

Wind Turbine Generators

5.52 Wind turbine towers, nacelles and turbine blades would be transported to the Site as abnormal loads. The tower sections and other turbine components would be stored at each turbine hardstanding area until lifted into position.

5.53 The components would be lifted by adequately sized cranes and constructed in modular fashion. Assembly, in general; requires only fixing of bolts, torqueing of nuts and electrical and hydraulic connections.

Cabling, Substation and Control Building

5.54 The location of the substation and control building is shown in Figure 4.1: Infrastructure Layout. Elevation and layout drawings for these structures are presented in Figures 4.10: Control Room and Substation Compound Elevation and 4.9: Control Room and Substation Compound Plan respectively. All cabling between the turbines and the substation on the Site would be laid in underground trenches, excavated by a mechanical digger. The top layer of soil is removed and used to reinstate the excavation, following the installation of the cables. Cabling would generally run parallel and adjacent to the Site tracks.

5.55 The substation and control building compound will cover an area of approximately 4,525 m^2 and will house a switchgear compound along with substation and control buildings.

Construction Compound and Other Temporary Works

5.56 A temporary construction compound of approximately 4,000 m^2 (i.e. 50m x 80m – see Figure 5.1: Temporary Construction Compound) and a temporary storage area of approximately 3,500 m^2 (i.e. 50m x 70m) would be established. These areas would include:

- temporary 'Portacabin' type structures to be used for Site offices, the monitoring of incoming vehicles and welfare facilities;
- toilet facilities would be provided with a packaged treatment system to be designed in liaison with SEPA;
- containerised storage areas for tools, small plant and parts;
- parking for approximately 32 cars/construction vehicles;
- a receiving area for incoming vehicles; and
- a bunded area for storage of fuels and greases.

5.57 Figure 5.1 shows a typical layout for the temporary construction compound and temporary storage area; the exact layout may be different in practice.

5.58 It is currently proposed that a waterless wheel washing facility would be established to ensure vehicles leaving the Site do not deposit material after leaving the Site. The design of this facility would be produced before site works commence in conjunction with the landowner, tenants and THC. This facility would be located at the Site entrance so that vehicles leaving the Site would pass over the wheel wash.

5.59 The temporary construction compound and temporary storage area would be constructed by topsoil excavation in a similar manner to the access tracks. Stone would be laid over a geotextile membrane which would provide a good structural base. Following construction of the Proposed Wind Farm Development the temporary facilities would be removed and soil and vegetation reinstated over the temporary construction compound area and temporary storage area.

5.60 During construction temporary fencing may be erected, as required, around the temporary construction compound, working areas, areas under restoration and, if necessary, areas identified as ecologically or archaeologically sensitive. See **Chapter 8: Ecology** and **Chapter and 10: Cultural Heritage and Archaeology.**

Anemometer Masts

5.61 As described in **Chapter 4: Description of Development**, one permanent, fixed anemometer mast would be erected on-site, as shown on Figure 4.1: Infrastructure Layout, and six temporary, mobile masts would also be utilised. The permanent mast would be free standing (non-guyed), with a steel lattice model design, set into a small concrete base typically 6 m x 6 m and 3 m deep, and would be up to 72 m in height (see Figure 4.3: Typical Masts: Permanent, Temporary and Communications). The temporary masts would be guyed structures and would be up to 72m in height.

Reinstatement

5.62 A programme of reinstatement would be implemented upon completion of construction. This would relate to track shoulders, the construction compound, crane hard-standings and cable trenches.

5.63 In terms of Site access tracks, after commissioning of the Proposed Wind Farm Development the shoulders of the tracks would be graded with the excavated subsoil, and then top soil and the vegetated layer would be placed on top of this. The shoulders would be allowed to re-vegetate either by leaving the incorporated seed bank in the topsoil to re-germinate, or by application of the appropriate seed mixes. Any seed mixes would be agreed with the landowner, THCand SNH. Reinstatement minimises the landscape impact of the roads and allows development of a natural vegetation cover on the track using local plant material.

5.64 It is essential that the Site access track width is retained during the operation of the Proposed Wind Farm Development to allow occasional crane access if required, hence no works to reduce width post-turbine erection are proposed.

5.65 For access tracks which have been cut into peat, reinstatement would involve laying subsoil peat on the cut batters and then placing peat turf and clods on top of this. During construction and where reasonably practicable, turves would be cut and watered to be used for reinstatement. Re-instatement would be carried out as soon as possible following access road formation to minimise the risk of turf drying. Following the completion of construction, the temporary construction compound and temporary storage area would be re-vegetated. The temporary facilities would be removed and topsoil that would have been scraped off during the creation of the construction compound would be re-used for landscaping.

5.66 After construction operations are complete, the temporary hardstandings would be reinstated. There would be a need to use cranes from time to time during the operation phase of the Proposed Wind Farm Development, so the main crane hard-standing would be left uncovered to ease maintenance activities. This area would be approximately 1,200 m^2 at each turbine.

5.67 The turbine bases would be treated in a similar manner to the access tracks after turbine construction is completed. The topsoil and subsoil from each base would be stored separately and, once construction of each foundation is complete, soil would be replaced in the correct sequence and the seed bank in the topsoil allowed to germinate or appropriate seed mixes applied.

5.68 Cable trenches would be similarly reinstated. Where practicable, vegetation over the width of the cable trenches would be lifted as turves, and replaced after trenching operations, to reduce disturbance.

5.69 Following delivery of the abnormal loads, the hardstanding area shown in green on Figure 4.6: Site Entrance will be re-vegetated to reduce visual impact. The area will either be constructed using truck pave or a similar material or will be re-soiled, and re-vegetated, to be agreed in consultation with the THC. The hardstanding area may need to be re-opened, with associated potential vegetation removal, in the event that further abnormal load deliveries are required post construction. If this occurs the hardstanding would be re-soiled and re-vegetated once more if appropriate.

Description of Decommissioning Works

5.70 The expected operational life of the Proposed Wind Farm Development is 25 years from the date of commissioning. Towards the end of this period a decision would be made as to whether to refurbish, remove, or replace the turbines. If refurbishment or replacement were to be chosen, relevant applications for consent would be made. If a decision were to be taken to decommission the Proposed Wind Farm Development this would entail the removal of all the turbine components, transformers, the sub-station and associated buildings. Cables would be cut away below ground level and sealed. The access tracks may be left on site to ensure the continued benefit of improved site access or they could be reinstated. Proposals in this regard would be described in the Decommissioning Method Statement, which would be prepared at the appropriate time prior to decommissioning works. It is not currently usual to remove the concrete foundations from the Site as this would cause more land damage than leaving them in situ. The exposed concrete plinth would be removed to a depth of 1 m below the surface and the entire foundation would be graded over with soil and would be replanted. This follows advice given in former PAN 45 (Revised 2002) (which advises in paragraph 33 that 'Concrete foundations may be best left in place and covered over') and the "Good Practice during Wind Farm Construction" guidelines by SNH, Scottish Renewables, SEPA and the Forestry Commission Scotland (2010) as well as the Scottish Government's web-based renewables advice which has replaced PAN 45. Guidance on good practice during wind farm decommissioning and/or re-powering has recently been published by SNH[6], and this and other relevant guidance will be referred to at the appropriate time.

5.71 In alkaline or neutral pH ground water conditions, no chemical degradation of the concrete foundation would take place. The concrete mass would remain intact and have no effect on the local soil or groundwater. In soft, acidic groundwater conditions (low dissolved calcium content, and high dissolved carbon dioxide content), where the water table is in contact with the concrete mass e.g. peat or marshland, sulphate attack of the concrete would tend to take place. This may cause alkali to leach into the ground water in contact with the concrete. If this effect occurs it would be highly localised around the foundations.

5.72 However, as discussed in the foundation construction section above, the concrete mix for the turbine foundations would be designed to withstand sulphate attack and it is therefore likely that the rate of alkali leaching would be low, and would not be expected to have a significant effect on the local soil or groundwater conditions. The chemical effects of leaving concrete foundations in the ground after decommissioning at the end of the Proposed Wind Farm Development's working life are therefore considered to be not significant.

5.73 If the Proposed Wind Farm Development obtains consent it is expected that an agreement would be put in place to allow for the establishment of a decommissioning bond or fund to be

[6] SNH (2013) Commissioned Report No. 591 Research and guidance on restoration and decommissioning of onshore wind farms

set aside for when the Proposed Wind Farm Development is decommissioned after its operational life. Prior to decommissioning of the Proposed Wind Farm Development a method statement would be prepared and agreed with the Planning Authority.

5.74 Unlike most other forms of electricity production, wind farms enjoy particular ease of decommissioning. Plant can readily be dismantled and removed from the Site and Site restoration is relatively straightforward with no legacy of significant pollution.

Site Environmental Management

5.75 This section details the environmental management controls that would be implemented by the Applicant and its contractors during the construction of the Proposed Wind Farm Development to ensure that potential significant adverse effects on the environment are prevented, reduced or where possible offset.

5.76 It would be a contractual requirement that the appointed construction contractor complies with the CDMS (a draft CDMS has been presented in **Technical Appendix 5.1**). The purpose of the CDMS is to:

- provide a mechanism for ensuring that measures to prevent, reduce or where possible offset potentially adverse environmental impacts identified in the ES are implemented;
- ensure that good construction practices are adopted and maintained throughout the construction of the Proposed Wind Farm Development;
- provide a framework for mitigating unexpected impacts during construction;
- provide a mechanism for ensuring compliance with environmental legislation and statutory consents; and
- provide a framework against which to monitor and audit environmental performance.

5.77 The Applicant has produced a draft CDMS in line with the information contained within this chapter and mitigation measures detailed elsewhere in the ES. Tendering contractors would be required to take account of the structure, content, methods and requirements contained within the draft CDMS. It is proposed that the final form of the CDMS would be agreed at the detailed design stage in consultation with the Planning Authority, SNH and SEPA, prior to construction. The draft CDMS is structured as follows:

- Section 1 Introduction
- Section 2 Reference Documents
- Section 3 Construction Philosophy
- Section 4 Design Philosophy
- Section 5 Construction Method
- Section 6 Decommissioning Method
- Section 7 Records
- Section 8 Appendices, including:
  - Appendix 1 - Environmental Requirements of Contractors
  - Appendix 2 - SuDS Design Philosophy
  - Appendix 3 - Water Quality Monitoring Procedure
  - Appendix 4 - Procedure in the Event of a Contaminant Spill
  - Appendix 5 - Waste Management

Site Induction

5.78 The principal contractor would ensure that all employees, sub-contractors, suppliers, and other visitors to the Site are made aware of the content of the CDMS that is applicable to them. Accordingly, environmental specific induction training would be prepared and presented to all categories of personnel working and visiting the Site.

5.79 As a minimum, the following information would be provided to all inductees:

- Identification of specific environmental risks associated with the work to be undertaken on Site by the inductee.
- Summary of the main environmental aspects of concern at the Site as identified in the CDMS, for instance:
  - Species and / or habitat protection requirements;
  - Any other areas of environmental sensitivity (ecological, archaeological, hydrological or geological) as demarcated on Site;
  - Pollution prevention (e.g. silt mitigation and protection of the water environment);
  - Ground stability and peat slide risk; and
  - Waste management.
- Environmental Incident and Emergency Response Procedures (including specific Environmental Communication Plan requirements).

5.80 A convenient sized copy of an Environmental Risk Map would be provided to all inductees showing all the sensitive areas, exclusion zones and designated wash out areas. The map would be updated and reissued as required. Any updates to the map will be communicated to all inductees through a tool box talk given by specialist environmental personnel. Regular tool box talks will be provided during construction to provide on-going reinforcement and awareness of environmental issues.

Pollution Prevention, Water Quality Monitoring and Emergency Response Plan

5.81 The draft CDMS details a number of measures to deal with pollution prevention, including Appendix 1 ‘Environmental Requirements of Contractors’, Appendix 2 ‘SuDS Design Philosophy’, Appendix 3 ‘Water Quality Monitoring Procedure’ and Appendix 4 ‘Procedure in the Event of a Contaminant Spill’.

5.82 SEPA has produced Pollution Prevention Guideline 5 for Works in, near or Liable to Affect Watercourses and 6 for Working at Construction and Demolition Sites for civil engineering contractors. The Proposed Wind Farm Development would be constructed using best practice in conformance with these requirements.

5.83 Contractors and sub-contractors shall be required to follow Pollution Prevention Guidance published by SEPA, and the following pollution control measures are explicitly incorporated into the draft CDMS:

- equipment shall be provided to contain and clean up any spills in order to minimise the risk of pollutants entering watercourses, waterbodies or flush areas;
- trenching or excavation activities in open land shall be restricted during periods of intense rainfall, and temporary bunding shall be provided as required to reduce the risk of oil or chemical spills to the natural drainage system;
- sulphate-resistant concrete (as detailed in BS EN206:1:2000 Concrete Part 1: *Specification, performance, production and conformity* and BS8500-1:2006 Concrete - Complementary British Standard to BS EN 206-1 Part 1: *Method of specifying and guidance for the specifier*) shall be used for the construction of turbine bases to withstand sulphate attack and the resultant alkaline leaching into groundwater;
- all refuelling will be undertaken at designated refuelling points. There will be no refuelling within catchments contributing to water supply points;
- equipment, materials and chemicals shall not be stored within or near watercourses. At storage sites, fuels, lubricants and chemicals shall be contained within an area bunded to 110%. All filling points shall be within the bund or have secondary containment. Associated pipework shall be located above ground and protected from accidental damage;
- concrete shall be brought onto site ready mixed, and any on-site washout shall occur in allocated, bunded areas;
- drip trays shall be placed under standing machinery;
- all solid and liquid waste materials shall be properly disposed of in controlled landfill sites away from the Site;
- routine maintenance of vehicles shall be carried out in a suitable, designated are of the Site which is located away from watercourses and other sensitive areas;
- site specific procedures for controlling dust will be followed, including dust containment and suppression techniques such as ensuring potential dust generating materials are moistened, sheeted or shielded from wind;
- there shall be no unapproved discharge of foul or contaminated drainage from the Proposed Wind Farm Development either to groundwater or any surface waters, whether direct or via soakaway;
- sanitary facilities shall be provided and methods of disposal of all waste shall be approved by SEPA;
- a programme of surface water quality monitoring would be undertaken during the construction phase to provide assurance as to the absence of water quality impacts; and
- the Applicant has a policy that no wind turbines, auxiliary and electrical equipment would contain askarels or PCBs.

5.84 In the unlikely event of an environmental pollution incident, there is an emergency response procedure (refer to Appendix 4 of the draft CDMS) to address any accidental pollution incident. For example, this requires the use of spill kits to contain the material and procedures to ensure that SEPA is notified immediately.

General Drainage Design

5.85 In accordance with best practice guidance[7], a minimum buffer distance of 50 m between the watercourses on the Site as mapped on Figure 3.2 and the Proposed Wind Farm Development's infrastructure has been adopted. No construction should occur within this buffer.

5.86 Correct design of the site drainage is an important element in maintaining the long term continued stability of peat, minimising erosion and the potential for pollution of the watercourses draining the Site. Accordingly the Applicant has prepared a SuDS Design Statement which describes the proposed SuDS design measures and rationale, including drawings showing the conceptual SuDS design. The SuDS Design Statement is provided in **Technical Appendix 11.3** of this ES. The potential impact of preferential routing of drainage, and associated erosion and sediment wash-off within the sub-catchments draining the Site would be mitigated through the following measures, which are incorporated into the draft CDMS:

- use of floating track design where the track crosses deeper peat or softer ground conditions to limit disturbance of peat and localised subsurface flow paths;
- construction of the floating tracks shall allow for continued drainage across the track, either through constructing the sub-base with coarse granular material or by constructing sub-surface drains through the peat at regular points along the length of the track;
- site track construction materials shall be free draining, strong, durable and well graded;
- settlement/attenuation ponds and silt fences shall be provided adjacent to the drains to prevent pollution and sedimentation of watercourses;
- direct drainage into existing watercourses shall also be avoided to ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses;
- the larger historical drains shall be piped directly under the track through appropriately sized drainage pipes or culverts. Appropriate scour prevention and energy dissipation structures shall be constructed at each culvert outlet. Where appropriate, a shallow, lateral drainage swale shall be installed at the toe of site track cuttings to intercept the natural runoff. This lateral drain shall be piped under the track at regular intervals through correctly sized cross drains away from watercourses. Again appropriate scour prevention and energy dissipation structures shall be constructed at each culvert outlet;
- flow and sediment transport in any track drainage swales shall be minimised by reducing concentrated flows, installing regular cross culverts and the use of checkdams placed at regular intervals within the roadside drainage swales;

[7] SEPA, EA, Environment and Heritage Service (October 2007) - Pollution Prevention Guidelines - Works and maintenance in or near water: PPG5

- track drainage swales, where required, shall discharge into sediment/attenuation ponds excavated on the downslope side or silt fences. A shallow drainage swale shall be cut directly downhill as a fan and at minimum slope until the bottom of the swale reaches the natural surface level. The discharge point of track drains shall be constructed to minimise concentrated flows and ensure flows are dispersed over a large area with appropriate surface protection;
- the depth of individual drainage swales shall be kept to the minimum necessary to allow free drainage of the tracks, and swale lengths shall be minimised to avoid disruption of natural drainage paths. Direct drainage into existing watercourses shall also be prevented to ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses; and
- clay or peat plugs shall be inserted within cable trenches at a frequency agreed with the Ecological Clerk of Works (ECoW) to suit the specific location to prevent gullying of trenches and preferential routing.

Runoff and Sediment Control

5.87 The following measures would be used to mitigate any potential impacts on the water quality of the sub-catchments through peat erosion, stream acidification, and metals leaching during construction. These are incorporated into the draft CDMS:

- use of floating track design where the track crosses deeper peat or softer ground conditions to limit disturbance of peat;
- appropriate sediment control measures (silt fences, settlement/attenuation ponds etc.) shall be used in the vicinity of watercourses, springs or drains where natural features (e.g. hollows) do not provide adequate protection;
- sediment control measures (e.g. checkdams, silt fences etc.) shall be employed within the existing artificial drainage network during construction. These would be regularly checked and maintained during construction and for an appropriate period following completion. The Outline Habitat Management Plan (**Technical Appendix 8.7**) prescribes the damming of active drains to sufficiently raise water levels to create suitable conditions for *Sphagnum* species ;
- watercourses shall be monitored throughout the construction period by the ECoW to identify any enhanced scouring of the catchment surface. If sediment from disturbed peat is excessively mobilised through the minor channels network these shall be mitigated by temporary sediment control measures (e.g. geotextiles/straw bales/brash);
- the extent of all excavations shall be kept to a minimum and during construction activities surface water flows shall be captured through a series of cut-off drains to prevent water entering excavations or eroding exposed surfaces. If dewatering of excavations is required, pumped discharges shall be passed through settlement/attenuation ponds and silt fences to capture sediments before release to the surrounding land;
- where there is permanent relocation of peat, the ground shall be re-instated with vegetation as soon as practicable;
- where practicable, vegetation over the width of the cable trenches shall be lifted as turves, and replaced after trenching operations, to reduce disturbance;
- the movement of construction traffic shall be controlled to minimise soil compaction and disturbance. Vehicle movements outside the defined tracks and hardstanding areas shall be avoided;
- trenching or excavation activities in open land shall be restricted during periods of intense rainfall, and temporary bunding shall be provided as required to reduce the risk of sediment transport to the natural drainage system; and
- temporary peat stockpiles shall be stored on a geotextile membrane and covered. Stored peats shall be placed so as to minimise the potential for erosion. Peat shall be stored in smaller stockpiles distributed in flat areas away from watercourses. These measures would be incorporated within the peat management plan (see **Technical Appendix 5.2**).

Peat Slide, Erosion and Compaction Management

5.88 Management of the risk of peat slides is now recognised in literature, and a range of measures have now become standard engineering practice for construction of roads over peat. These would be adopted, as appropriate on the Site, ensuring that:

- concentrated loads, such as those arising from stockpiling of material from turbine foundation excavations, would not be placed on marginally or potentially marginally stable ground;
- concentrated water flows arising from any aspect of construction or operation of the Proposed Wind Farm Development would not be directed onto peat slopes and unstable excavations;
- construction would be supervised on a full time basis by engineers fully qualified and experienced in geotechnical matters;
- robust drainage plans would be developed;
- work practices would be reviewed, modified as necessary and adopted to ensure that existing stability is not compromised; and
- appropriate ground investigation and movement monitoring practices would be adopted.

5.89 The major contributory triggering cause of peat-slides is heavy rain. Almost invariably, peat-slide events are preceded by unusual weather conditions typically characterised by a long dry summer that leads to desiccation cracking of the peat profile followed by a prolonged continuous rainfall including exceptionally heavy rainstorms.

5.90 The condition of the sliding surface at the base of the profile has a strong influence on potential mobility and depends on the regularity and smoothness or roughness of the underlying rock-head.

5.91 According to the Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments[8], peat slides tend to occur where the peat slab is less than 2 m deep and where the slope is steeper, between 5 and 15 degrees.

5.92 In terms of erosion, there would be no excavation of areas of deeper peat. Where deeper peat has been identified, floating road would be constructed. The floating road would be relatively flat and detailed design of appropriate drainage from the road surface to the surrounding peat land would ensure that runoff would not create gullies and erosion through the peat. The creation of a floating road would not lead to any mechanism whereby the area of peat would dry out and therefore no windblown erosion is predicted.

5.93 A Peat Stability Risk Assessment has been completed for the Proposed Wind Farm Development and is included in **Technical Appendix 5.4**. This demonstrates that the risk of peat slide events occurring is classified as Very Low to Low (as detailed in paragraph 5.32 above).

Peat Management Plan

5.94 A separate Peat Management Plan is provided as **Technical Appendix 5.2**. It provides details of the predicted volumes of peat that would be excavated on the Site, the characteristics of the peat that would be excavated, and how the excavated peat would be reused and managed. The report concludes that there are sufficient peat re-use options within the Site and therefore a waste management plan for peat is not required for the Proposed Wind Farm Development. The Peat Management Plan will be updated during the detailed design phase and agreed with the Planning Authority in consultation with SEPA prior to construction.

5.95 In line with best practice, the following order of preference will be used to relocate excess peat spoil:

- reinstatement locally around construction works - peat excavated for the construction compound and turbine foundations shall be replaced on completion of the works as part of the reinstatement of the Site to minimise movement of materials;
- along access tracks - floated tracks shall incorporate stabilisation bunds to enhance stability. In addition, the peat shall be stored in strips on one or both sides of tracks as identified during detailed design. Design criteria shall include consideration of peat thickness and strength, slope angle and effect of surcharge on stability, and would include specification of maximum allowable mound heights;
- landscaping in and around Site infrastructure - any cut and/or fill sections of infrastructure shall be landscaped using excess peat from excavations to reduce visual impact;
- any additional stockpile locations shall be identified based on similar criteria to track-side storage; and
- at all locations where relocation of excess material is required, the vegetation shall be stripped, stored and replaced to re-establish growth and provide erosion protection as soon as reasonably practicable. All stockpiles, temporary and permanent, shall be designed with appropriate drainage systems and include a monitoring plan to provide early warning of potential peat slide events. A response plan shall also be put in place to provide fast and effective action in the event of any peat movement.

[8] Scottish Government (2007) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments

Health and Safety Management

5.96 All sub-contractors would be pre-qualified before tender and their Health and Safety records rigorously reviewed. All sub-contractors would be required to adhere to the Applicant Health and Safety Requirements for Sub-contractors.

Tree Felling

5.97 **Chapter 4: Description of Development** describes proposals for tree felling and replanting on Site. As the areas of felling are relatively small, the trees will be hand cut by the Estate. All works will be carried out in accordance with the UK Forestry Standard and Forestry Commission Forest and Water Guidelines, in consultation with the Estate Forester. As much of the felled timber will be recovered as possible for use as domestic wood fuel on the Estate. Any remaining material will be used as mulch for the replanted areas of woodland.

Site Waste Management Plan

5.98 A Site Waste Management Plan (SWMP) would be prepared and implemented for the construction, operation and decommissioning phases, as detailed in Appendix 5 of the draft CDMS (**Technical Appendix 5.1**) and the Applicant's site staff shall ensure that all sub-contractors adhere to this plan. An outline of the anticipated waste streams from the Proposed Wind Farm Development is provided as follows:

- waste from welfare facilities, e.g. food, paper, glass and other typically domestic refuse;
- waste timber;
- concrete washout water;
- waste fuels and oils;
- waste metals;
- packaging and miscellaneous wastes; and
- Dedicated storage areas and facilities to segregate waste streams would be provided on-site. A concrete washout facility would be provided at a suitable location on site.

5.99 The Site Waste Management Plan would be further developed in conjunction with the ultimate Contractor and agreed with the Planning Authority in consultation with SEPA prior to construction.

Traffic Management Plan

5.100 As detailed in **Chapter 14: Access, Traffic and Transport**, a Traffic Management Plan (TMP) will be developed to ensure road safety for all road users during transit of development loads. The TMP would outline measures for managing the convoy and would set out procedures for liaising with the emergency services to ensure that police, fire and ambulance

vehicles are not impeded by the loads. The TMP would be developed in consultation with the Planning Authority, the police, highways authorities and the local community and agreed before deliveries to the Site commence.

Ecological Management Plan

5.101 The draft CDMS in **Technical Appendix 5.1** contains an outline Ecological Management Plan (EMP) which sets out the measures required to protect and enhance ecology and hydrology at the Site during the construction phase, including pre-construction surveys, habitat management and biodiversity enhancement. A detailed EMP will be prepared and agreed with the Planning Authority and SNH prior to commencement of construction.

5.102 An Ecological Clerk of Works (ECoW) would be present during the construction period to ensure that ecological impacts are appropriately mitigated in line with the EMP.

Protection of Archaeology and Cultural Heritage

5.103 There is potential for undiscovered archaeological features to exist within the Site. An archaeological watching brief would be required on a proportion of ground works in areas of greatest archaeological potential. The precise extent of the works that would be subject to a watching brief would be agreed with THC Historic Environment Team and Historic Scotland prior to any construction works commencing. The purpose of such a watching brief would be to determine the presence, character, extent and significance of any currently unknown archaeological features or artefacts that may be disturbed by ground breaking works.

5.104 Further information on the assessment of the impacts of the construction phase on archaeological assets, and how they could be controlled, is given in **Chapter 10: Cultural Heritage and Archaeology**.

Public Liaison

5.105 A contact name and telephone number of an appropriate member of the Applicant team would be identified and displayed at the entrance to the Proposed Wind Farm Development. The contact name and details would be provided to all the relevant stakeholders by the principal contractor/the Applicant prior to the start of the construction works.

5.106 Communication with the public would be the responsibility of the Applicant. This would involve communications with the relevant stakeholders and would be on a regular basis to inform them of forthcoming construction activities, timings of abnormal loads and to establish and maintain good relationships with them.

Summary

5.107 Construction is predominantly a civil engineering operation and would be phased over an approximate 28 month period. Construction of tracks and foundations would be progressive, minimising the number of simultaneously active locations and ensuring that traffic density is kept low. Erection would span a 22 week period toward the end of the work programme.

5.108 A programme of Site reinstatement would be put in place to minimise the visual and ecological impacts on the land.

5.109 The Proposed Wind Farm Development would operate for 25 years and would require only limited maintenance and inspection visits.

5.110 A restoration plan would be prepared and agreed with the relevant authorities towards the end of the Proposed Wind Farm Development's operating life. It is recognised that SNH intends to publish a chapter on Restoration and Decommissioning Plans (RDPs) for onshore wind farms[9] within the guidance document Good practice during wind farm construction (2010)[10], and cognisance will be paid to this guidance by the Applicant.

5.111 Table 5.1 provides a summary of the main potential environmental impacts during the construction phase and how these impacts would be managed and mitigated.

Table5.1: Summary of Potential Environmental Impacts during Construction and Decommissioning

Receptor	Potential Impacts	Mitigation
Landscape and Visual	Temporary impacts on landscape and visual amenity of the locality from the various elements of the construction activities.	Development areas to be restricted to those shown in Figures 4.1-4.12 and 5.1 (including micrositing allowance). Impacts to be controlled though efficient programming of works and reinstatement to be carried out as identified in the draft CDMS. Refer to Chapter 7: Landscape and Visual Impact Assessment for further details.
Ecology	Temporary or permanent damage or loss of habitat. Injury or death of protected species and other animals or fish.	Impacts to be controlled by Ecological Management Plan. Refer to Chapter 8: Ecology for further details.
Ornithology	Disturbance to breeding species and wintering birds.	Impacts to be controlled by Ecological Management Plan. Refer to Chapter 9: Ornithology for further details.
Cultural Heritage & Archaeology	Accidental damage to identified features or to unrecorded buried remains.	Impacts to be controlled through measures outlined in the draft CDMS. Refer to Chapter 10: Historic Environment for further details.
Geology, Hydrology and Hydrogeology	Accidental spills and releases of fuels and construction materials, and silt from earthmoving operations, into watercourses.	Impacts to be controlled through measures outlined in the draft CDMS. Refer to Chapter 11: Geology, Hydrology and Hydrogeology for further details.

[9] As detailed in SNH (2013) Commissioned Report No. 591 Research and guidance on restoration and decommissioning of onshore wind farms

[10] Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency and Forestry Commission Scotland (October 2010) *Good Practice During Wind Farm Construction*

Table5.1: Summary of Potential Environmental Impacts during Construction and Decommissioning		
Receptor	**Potential Impacts**	**Mitigation**
Transport	Temporary adverse traffic disruption caused by Site traffic and an increase in HGV movements	Impacts to be controlled through a Traffic Management Plan, to be agreed with the local roads authority prior to construction commencing. Refer to Chapter 14: Traffic and Transport for further details.
Noise	Potential for noise to be generated by construction activities.	Impacts to be controlled though appropriate working hours, and through compliance with draft working method statements set out in the CDMS, including mitigation measures to accord with BS 5228 'Noise control on construction and open sites'. Refer to Chapter 12: Noise for further details.
Air Quality and Dust	Generation of wind blow dust from construction activities. (Note that the nearest sensitive receptor (Little Aitnoch) is more than 900 m from the nearest turbine therefore effects associated with dust generation are considered to be negligible).	Impacts to be controlled through measures outlined in the draft CDMS.
Socio-economics	Increase in temporary (and to a lesser extent permanent) employment opportunities for local people.	No mitigation required.

6 EIA Process & Methodology

Introduction

6.1 This chapter describes the EIA process, including screening and scoping procedures, and includes a summary of the consultation responses received during the scoping exercise for the Proposed Wind Farm Development. It also provides details of how these responses have been addressed in the EIA. The chapter also describes the EIA methodology that has been followed and includes details about the process and purpose of baseline characterisation and assessment of impacts. Finally, a rigorous evaluation of the ES against best practice guidance is provided, to demonstrate compliance.

6.2 This chapter is accompanied by the following technical appendices:

- **Technical Appendix 6.1: EIA Scoping Opinion**
- **Technical Appendix 6.2: THC Pre-Application Pack**

Environmental Impact Assessment Process

6.3 EIA is a process that identifies the potential environmental impacts (both positive and negative) of a proposed development and aims to prevent, reduce, mitigate and/or offset any adverse environmental impacts. Proposed developments to which EIA is applied are those that 'are likely to have significant impacts on the environment by virtue of factors such as their nature, size or location'. The EIA process has a number of key characteristics:

- it is systematic, comprising a sequence of tasks defined both by regulation and by practice;
- it is consultative, with provision being made for obtaining feedback from interested parties including statutory agencies and the community;
- it relies on the most up-to-date information on the nature and sensitivity of the environment;
- it is predictive, using techniques and professional judgement to estimate the potential nature, size and significance of environmental change;
- it is transparent; the information and assumptions upon which assessments are made are set out clearly, as are limits to knowledge and to the capability of the predictive tools employed in the assessment process; and
- it is iterative, allowing opportunities for environmental concerns to be addressed during the planning and design of a project.

6.4 The process and outcomes of the assessment are presented in a single document, known as the ES. The ES should be a clear and concise summary of the proposed development and its potential environmental impacts - including primary, secondary, direct, indirect and cumulative impacts - on the natural, built and human environments. The ES is submitted to a competent authority (in this case the Scottish Government Energy Consents and Deployment Unit) in support of an application for development consent, and provides the competent authority, statutory consultees and the wider community with sufficient information to make an objective judgement as to its acceptability within the context of national, regional and local planning and environmental policy.

6.5 Legislation on EIA was implemented in the UK following the adoption of the 1985 EC Directive (No. 85/337/EEC) "on the assessment of the effects of certain public and private projects on the environment". New legislation was then introduced following the adoption of the amended 1997 EC Directive (No. 97/11/EEC). In Scotland, with regards to the Proposed Wind Farm Development, the 1997 Directive is transposed into law through the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (hereafter referred to as the 'EIA Regulations'). These set out the statutory process and minimum requirements for environmental assessment for those projects that are required to undergo such an assessment. Specifically, they prohibit the granting of planning permission for EIA developments unless environmental information on potentially significant environmental effects is considered by the competent authority in reaching its decision on the application. Environmental information includes the ES, which is the applicant's own assessment, together with any further information provided by the applicant and any representations provided by consultees and the public about the proposal's environmental effects. In this report, the terms impacts and effects are used interchangeably, as discussed later in the methodology section of this chapter.

Screening, Scoping and Consultation

Screening

6.6 Screening is the term in the EIA Regulations used to describe the process in which the need for EIA is considered. Applicants can formally request a screening opinion from the competent authority prior to submitting an application, but are under no obligation to do so.

6.7 The Applicant has considered the Proposed Wind Farm Development in light of the EIA Regulations and concluded that, due to the nature and scale of the Proposed Wind Farm Development and the potential for significant environmental effects, there is a requirement for EIA as set out in Table 3(i) of Schedule 2 to the EIA Regulations. Under the EIA Regulations, if there are likely significant environmental effects, EIA is required for an installation for the harnessing of wind power for energy production (wind farms) if the development involves the installation of more than two turbines; or the hub height of any turbine or height of any other structure exceeds 15 m.

Scoping

6.8 An applicant can request a 'Scoping Opinion' from the competent authority on the information to be provided in an ES. The purpose of scoping is to "identify the key issues to be considered; identify those matters which can either be scoped out or which need not be addressed in detail; and discuss and agree appropriate methods of impact assessment, including survey methodology where relevant. " (PAN 1/2013).

6.9 In accordance with Regulation 7 of the EIA Regulations, the Applicant sought a Scoping Opinion for the Proposed Wind Farm Development from the Scottish Government Energy Consents and Deployment Unit (ECDU) in May 2013. This request was accompanied by a Scoping Report, prepared by the Applicant, which set out a summary of the Proposed Wind Farm Development, identified the issues proposed to be addressed in the EIA, and proposed an approach to the assessment of impacts in each case. The Scoping Report was simultaneously issued to a list of statutory and non-statutory consultees. A scoping opinion was received from the ECDU on 25th July 2013 and is included as **Technical Appendix 6.1**. The content is summarised in Table 6.1 below, along with a list of all bodies consulted during the scoping exercise. The full Scoping Opinion is reproduced in **Technical Appendix 6.1**.

6.10 The Applicant also made use of the THC Major Application pre-application meeting as part of its EIA Scoping work, which was held on 12th June 2013. The purpose of the meeting was to introduce the Proposed Wind Farm Development to various council officers at THC and obtain detailed feedback regarding the scope of the EIA to be carried out. The relevant responses received as part of this meeting are included in Table 6.1, and the THC Pre-Application Advice pack is included as **Technical Appendix 6.2**.

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
Statutory Consultees			
Scottish Government Energy Consent and Deployment Unit	Y – 25th July 2013	The ECDU Scoping response has generic guidance on EIA method and ES content to satisfy regulations, as well as being a conduit for the other consultee responses. Prescribed content of the ES: ▪ Non-technical summary ▪ Site selection & alternatives ▪ Description of the development proposal ▪ Track construction ▪ Decommissioning ▪ Grid connection details Baseline assessment and mitigation elements: ▪ Air and climate emissions ▪ Carbon emissions ▪ Design, landscape and the built environment ▪ Construction and operation Ecology, biodiversity and nature conservation including: designated sites; habitats; habitat management; species, plants and animals; and archaeology and cultural heritage; Water environment, including: hydrology and hydrogeology; geology and soils; assessment of peat slide risk; and forestry/woodlands. Other material issues, including waste; telecommunications; noise; shadow flicker; traffic management; and cumulative effects.	The prescribed content is covered in this ES, which brings together the advice and recommendations of a number of independent specialists on the relevant topic section (in Chapters 7 – 15). The grid connection details are not currently known and therefore no environmental assessment of the grid connection is included in this EIA.
The Highland Council (THC)	Y – 14th June 2013; Pre-Application Consultation meeting - 12th June 2013; Pre-Application Advice Pack - 10th July 2013	The ES should consider relevant development plan policies and national planning guidance. Although the site lies largely within a Stage 3 area (area of search), it is partially within a Stage 2 area and it is adjacent to features of Stage 1 areas which may be impacted by this development as identified in the Onshore Wind Energy Interim Supplementary Guidance.	Addressed in **Chapter 2: Planning and Policy Context** and in the Planning Statement
		The ES should estimate who may be affected by the development, including individual households, local communities or a wider socio economic groupings such as tourists & tourist related businesses, recreational groups, economically active, etc.	Addressed in **Chapter 15: Socio-Economics**. Potential effects on local householders in terms of noise, shadow flicker, TV reception and private water supplies are addressed in **Chapter 13: Electromagnetic Interference,**

Table 6.1: Scoping Consultation			
	Response Received?	**Issues Raised**	**Where in the ES is this Addressed?**
			Aviation and Shadow Flicker, **Chapter 12: Noise** and **Chapter 11: Hydrology, Hydrogeology and Geology**.
		Recognise community assets that are currently in operation, e.g. road network (see below), footpaths, TV, radio, telecommunication links, radar, aviation interests, tourist routes etc.	TV, radio, telecommunication links, radar and aviation interests are addressed in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**. Other issues raised are addressed in **Chapter 14: Access, Traffic and Transportation** and in **Chapter 15: Socio-Economics**
		Viewpoints (VP) for the assessment of visual impacts of the proposed development must be discussed with The Highland Council in consultation with Scottish Natural Heritage.	The VP list has been agreed with THC and SNH
		Wild Land is a key factor with regard to this proposal and should be further discussed with Scottish Natural Heritage	Addressed in **Chapter 7: Landscape and Visual**
		Assessment of the cumulative impact of the development in combination with other proposals of this type in the surrounding area, as well as the issue of sequential viewing particularly to travellers through the area, should feature in the final ES. This should include assessment of potential cumulative impacts in combination with any developments which lie within 25km of an agreed viewpoint where there is visibility of both developments.	Cumulative visual impacts are addressed in **Chapter 7: Landscape and Visual** and **Chapter 10: Cultural Heritage and Archaeology**
		A Transport Assessment should be submitted as part of the planning application detailing proposed routes and volumes for all construction related traffic and required mitigation measures.	Addressed in **Chapter 14: Access, Traffic and Transportation**
		The extent and detail of all road improvement and strengthening works need to be agreed with The Highland Council's TEC Services.	
		An assessment of the capacity of existing bridges and other structures along the construction access route(s) to cater for all construction traffic will be required.	
		A Traffic Management Plan will be required describing proposed measures to manage traffic during the construction and operation period.	
		The ES should address likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development.	Addressed in **Chapter 8: Ecology**
		The ES should identify rare and threatened habitats including peat habitats.	
		The ES should address likely significant effects of the development on the local geology and the nature of the hydrology and hydrogeology of the site, and of the potential impacts on water courses, private supplies and the aquatic interests within local watercourses.	Addressed in **Chapter 11: Geology, Hydrology, Hydrogeology** and **Chapter 8: Ecology**
		The ES should consider the risks of engineering instability relating to presence to peat on the site as well as the issue of carbon balance.	Addressed in **Chapter 4: Description of Development** and in **Chapter 11: Hydrology, Hydrogeology and Geology**. Peat stability has been assessed in **Chapter 5: Construction and Decommissioning**.
		The interaction between forestry and any development is going to be critical and requires careful assessment.	Some woodland felling is proposed on the Site and will be undertaken in accordance with the Scottish Government Policy on the Control of Woodland Removal. Detail of the felling and replanting proposals is provided in ES **Chapter 4: Description of Development** The impacts of the tree felling and replanting are considered in the EIA, including **Chapter 7: Landscape and Visual**; **Chapter 8: Ecology** and **Chapter 11: Geology, Hydrology and Hydrogeology**.
		The ES should address existing air quality and the general qualities of the local environment including background noise. The applicant will be required to submit a noise assessment with regard to the	Addressed in **Chapter 12: Noise** and in **Chapter 6: EIA Process and Methodology** (under Non-significant Issues). Potential dust impacts during the construction phase are addressed within **Chapter 5: Construction and Decommissioning**.

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
		operational phase of the development. The assessment must be able to demonstrate that noise levels will comply with either a simplified standard of 35dB LA90 at wind speeds up to 10m/s or a composite standard of 35dB LA90 (daytime) and 38dB LA90 (night time) or +5dB above background noise levels. The assessment should be carried out in accordance with ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and it's associated Code of Good Practice recently published by the Institute of Acoustics. The noise assessment must take into account the potential cumulative effect from any other existing, consented or proposed wind turbine developments in the vicinity.	
		The applicant will be required to submit a noise assessment with regard to the construction phase. The assessment should be carried out in accordance with BS 5228-1:2009 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise".	Addressed in **Chapter 12: Noise**
		The ES should identify all designated heritage / cultural sites which may be affected by the development either directly or indirectly.	Addressed in **Chapter 10: Cultural Heritage and Archaeology**
		An assessment should be provided of the proposal's impact on outdoor access in line with SNH guidance. While there may be no public rights of way, core paths or publicised routes on the site it is subject to the broader access rights conferred by the Land Reform (Scotland) Act 2003. Not far outside the redline boundary are many more elements of outdoor access that may well be affected by this proposal. Those elements should include not only the features in our area [The Highland Council] but also those of our neighbours Moray Council and the Cairngorms National Park Authority.	Addressed in **Chapter 15: Socio-Economics**
		An access management plan demonstrating how the Applicant intends to manage access before, during and after construction should be submitted with the application, addressing how the proposals will accommodate different types of access (walkers, cyclists and horse riders).	Addressed in **Chapter 15: Socio-Economics**
		The Design and Access Statement should outline the design principles and concepts that have been applied to the development and	The Design and Access Statement is submitted as a stand-alone document with the application.
		Reference should be made to the Council's Sustainable Design Guide: Supplementary Guidance for advice & guidance on a range of sustainability topics, and a Sustainable Design Statement produced that addresses the relevant issues detailed in guidance's check list. Supporting information should be provided on the standards set out in the checklist where it is relevant to scale, type and size of your proposal.	Addressed in the Design and Access Statement and **Chapter 3: Design Evolution and Alternatives**
Scottish National Heritage (SNH)	Y – 30th May 2013 Pre-Application Consultation meeting - 12th June 2013; Pre-Application Advice Pack - 10th July 2013	SNH request that the ES should identify any visual impacts of the wind farm on the surrounding landscape and visual amenity of the area and the potential for significant cumulative impacts in relation to the neighbouring proposed and operational wind farms. This should include an assessment on the transport routes that traverse the area, e.g. A939, B9007 and the A940.	Addressed in **Chapter 7: Landscape and Visual**
		An assessment of impacts on the Special Landscape Qualities of the Cairngorms National Park should take place within the LVIA. Additionally, SNH expect that the LVIA will need to carefully consider the extent to which the proposal would impact upon the Drynachan, Lochindorb and Dava Moor Special Landscape Area (SLA).	
		An assessment of impacts on the Special Landscape Qualities of the Cairngorms National Park should take place within the LVIA. Additionally, SNH expect that the LVIA will need to carefully consider the extent to which the proposal would impact upon the Drynachan, Lochindorb and Dava Moor Special Landscape Area (SLA).	
		A revised and updated list of wind farm proposals should be sought from both The Highland Council and Moray Council to ensure the most up to date information is used.	

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
		The cumulative assessment within the LVIA should follow our guidance paying particular attention to landscape and visual on the transport routes that traverse the area, (such as the A939, B9007 and the A940) and the Dava Moor SLA.	
		SNH advised that there are no statutorily designated sites within the proposed wind farm boundary. However, there are a number of sites within 20 km which may be affected by this proposal.	Addressed in **Chapter 7: Landscape and Visual**, **Chapter 8: Ecology** and **Chapter 9: Ornithology**
		SNH requested further detail on the methodology used for the surveys regarding wildcat and pine marten.	Addressed in **Chapter 8: Ecology**
		SNH agreed that it is unlikely that red squirrel is present on the site and that this species could be scoped out.	
		SNH agreed with the proposed species survey list outlined in the Scoping Report.	
		SNH advised that all bird survey methods, results and any mitigation measures should be included in the ES, if necessary in a confidential annex.	Addressed in **Chapter 9: Ornithology** and **Technical Appendix 9.1**
		Extended Phase 1 and NVC surveys should be undertaken, as proposed in the Scoping Report. The results of these surveys should be presented in the ES, and all Annex 1 and BAP Priority Habitats and Groundwater Dependent Terrestrial Ecosystems (GWDTEs) should be mapped to NVC standard.	Addressed in **Chapter 8: Ecology**
		The ES should also fully consider the potential natural heritage impacts of vehicle movements, track creation and modification along the full length of the proposed routes, including those outside the development area.	Addressed in **Chapter 8: Ecology** and **Chapter 14: Access, Traffic and Transportation**
		Where needed, thorough peat probing should be carried out at the proposed turbine locations, tracks and other infrastructure, and used to inform a peat slide risk assessment.	The design iterations have taken account of peat probing carried out across the Site, as detailed in **Chapter 3: Design Evolution and Alternatives**. The peat probing results are presented in ES **Chapter 11: Hydrology, Hydrogeology and Geology**. In addition, a peat slide risk assessment and a peat management plan are presented as an appendix to **Chapter 5: Construction and Decommissioning**.
		An assessment of impacts of hydrological changes, particularly related to groundwater, on habitats should also be included.	Addressed in **Chapter 8: Ecology** and **Chapter 11: Geology, Hydrology and Hydrogeology**
		A habitat survey following the Scottish Fisheries Coordination Centre method should take place on areas directly or indirectly affected by the Site. Where there is habitat suitable for freshwater pearl mussel, and particularly where salmonids are present, we would expect a freshwater pearl mussel survey to be carried out following our guidance.	
		We would expect that any felling would be undertaken in accordance with the Scottish Government Policy on the Control of Woodland Removal and in consultation with Forestry Commission Scotland.	Addressed in **Chapter 4: Description of Development**
		Decommissioning and redevelopment of the site are both potential options, the EIA process should briefly consider the implications and assess the likely impacts of both.	Addressed in **Chapter 5: Construction and Decommissioning**
		If the details of all or part the grid connection at the time of ES submission, these details should be included in the ES along with assessments of the impacts of the grid connection on the natural heritage	The grid connection details are not currently known and therefore no assessment of potential environmental impacts of the grid connection on the natural heritage is included in this ES.
Scottish Environment Protection Agency (SEPA)	Y – 14th May 2013 Pre-Application Pack - 10th July 2013	SEPA identified a range of issues to be addressed including: ▪ Carbon balance;	Carbon balance addressed in **Technical Appendix 11.1** (Scottish Government Carbon Calculator)
		▪ Disruption to wetlands, especially groundwater dependant terrestrial ecosystems;	Disruption to wetlands addressed in **Chapter 8: Ecology** and **Chapter 11: Geology, Hydrology, Hydrogeology**
		▪ Disturbance and re-use of excavated peat;	Disturbance and re-use of excavated peat addressed in **Technical Appendix 5.2: Peat**

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
			Management Plan
		▪ Tree felling;	Tree felling addressed in **Chapter 4: Description of Development**
		▪ Engineering activities in the water environment;	Engineering activities in the water environment, existing groundwater abstractions and water abstractions addressed in **Chapter 11: Geology, Hydrology, Hydrogeology**
		▪ Existing groundwater abstractions;	A private water supply risk assessment has been conducted and results are presented in ES **Chapter 11: Hydrology, Hydrogeology and Geology**.
		▪ Water abstraction;	No water abstractions are proposed on the Site.
		▪ Pollution prevention and environmental management; and	Pollution prevention and environmental management addressed in **Chapter 5: Construction and Decommissioning;**
		▪ Borrow pits.	There will be no borrow pit on the Site.
Historic Scotland (HS)	Y – 4th June 2013 Pre-Application Advice Pack - 10th July 2013	HS confirmed that there are no scheduled monuments; category A listed buildings, gardens or designed landscapes or Inventory Battlefields within the development site.	Addressed in **Chapter 10: Cultural Heritage and Archaeology**
		The ES should consider the potential for indirect effects upon: Scheduled Monuments ▪ Category A Listed Buildings ▪ Gardens and Designed Landscapes	
		The ES should contain a full appreciation of the setting of the following heritage assets and the likely impacts on their settings: Scheduled Monuments ▪ Ardclach Bell Tower ▪ Levrattich, cairn ▪ Dunearn, fort ▪ Lochindorb Castle ▪ Aitnoch, cairn, hut circle & field system A Listed Monuments ▪ Glenferness House ▪ Ardclach Bell Tower ▪ Dunphail House ▪ Darnaway Castle Gardens and Designed Landscapes ▪ Relugas House ▪ Darnaway Castle	
		HS notes that the assessment of indirect impacts on historic environment assets is to be undertaken within 10 km of the proposed wind farm, and would advise caution with using a fixed distance for such as assessment as there could be potential impacts on assets beyond this distance.	
		HS recommended that the potential cumulative impacts of the proposed development in combination with other developments in the vicinity should be assessed.	
Scottish Water	No	N/A	No response required
Non-Statutory Consultees			
Association of Salmon Fishery Boards (ASFB)	Y – 29th May 2013	Consultation should be undertaken with Findhorn District Salmon Fishery Board and Findhorn, Nairn & Lossie Fishery Trust.	Addressed in **Chapter 8: Ecology**

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
		Guidelines on assessing potential impacts on migratory fish species and the fisheries they support, as set by ASFB, should be fully considered throughout the planning, construction and monitoring phases of the proposed development.	
British Horse Society (BHS)	Y – 14th May 2013	BHS advised that the site and surroundings are well used by both visiting and local horse riders.	Addressed in **Chapter 15: Socio-Economics**
		BHS advised that there are a couple of equestrian tourism businesses in the area so the Proposed Wind Farm Development should be equestrian friendly.	
		BHS advised that all tracks should be preserved as multi-use, access controls should be made by horse friendly and all surfaces should be suitable and equestrian access should be improved where possible.	Access tracks on the Site will be retained throughout the operational phase of the wind farm. A description of the track design is presented within ES **Chapter 5: Construction and Decommissioning** and details of access controls are presented in **Chapter 15: Socio-Economics.**
BT	No	N/A	No response required
Civil Aviation Authority (CAA)	Y – 28th May 2013	CAA advised that wind turbines can cause a physical obstruction to aviation stakeholders, as well as impact primary and secondary radars, which should be taken into account.	Addressed in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**
		If the Proposed Wind Farm Development is approved, the Defence Geographic Centre should be informed of the locations, heights and lighting status of the turbines and meteorological masts, the estimated and actual dates of construction and the maximum height of any construction equipment to be used, prior to the start of construction, to allow for the appropriate inclusion on Aviation Charts, for safety purposes.	
Cairngorms National Park Authority (CNPA)	Y- 27th May 2013	The ES should pay detailed regard to the special qualities of the National Park, as set out within the Cairngorm National Park Partnership Plan, and consider potential impacts on the park's landscape setting.	Addressed in **Chapter 7: Landscape and Visual**
		The potential for ecological impacts upon the Park should be fully considered and reported on.	Addressed in **Chapter 8: Ecology**
		Socioeconomics chapter should consider impacts in relation to the four aims of the National Park which are linked to economic and social issues as set in the National Park Partnership Plan.	Addressed in **Chapter 15: Socio-Economics**
		CNP agreed with the list of LVIA viewpoints and suggested that the following should also be included: ▪ A viewpoint where one leaves the national park on the A939 ▪ A viewpoint to consider sequential impacts travelling northwards from the national park on the A939 and B9007 ▪ A cumulative wireline from the Ptarmigan restaurant	Addressed in **Chapter 7: Landscape and Visual**
		The Landscape Officer recognised some potential significant visual and cumulative effects that the Proposed Wind Farm Development may have on: ▪ Landscape Character and Setting; and ▪ Special landscape qualities including wildness.	
East Nairnshire Community Council	Y – 13th July 2013	The ES should include maps showing all proposed Wind Farm developments within the 30km scoping area including the infrastructure required to connect them to the grid and any infrastructure required to service the developments.	Figures showing cumulative wind farm developments within a 35 km radius of the wind farm are provided in ES Volume 3: Landscape and Visual Figures. Information regarding potential cumulative impacts is provided in each of the technical chapters of the ES. Maps showing grid connection infrastructure for all cumulative wind farms have not been provided as this information is not typically confirmed in wind farm consent applications.
		Information relating to the cumulative effects of all the proposed developments should be presented at public exhibitions	A cumulative wind farm map was on display at the public exhibitions, held on 16-18th September 2013. Further information on the consultation undertaken for the Proposed Wind Farm Development is provided in the standalone Consultation Report which

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
			accompanies the application for Section 36 consent.
		Photographs taken from every property within two miles of the development with superimposed images of the development to show the direct impact upon individual members of the community	Representative viewpoints from nearby residential and recreational receptors have been selected, as detailed in **Chapter 7: Landscape and Visual**
		The Applicant should explore the possibility of securing the future of the woodland above Glenferness to preserve a screen for the proposed development	Addressed in **Chapter 7: Landscape and Visual**
Edinkillie Community Association (ECA)	Y – 3rd June 2013	ECA advised that potential visual impacts may affect their community area, A940 and Dava Way. These impacts might have a cumulative effect on the area, since other cumulative developments adjoin the Site.	Addressed in **Chapter 7: Landscape and Visual** and in **Chapter 15: Socio-Economics**
		Due to the presence of the Proposed Wind Farm Development, tourism would be affected.	Addressed in **Chapter 15: Socio-Economics**
		Road issues may appear due to abnormal loads linked to turbine transport. Theses should be reviewed and mended weekly.	Addressed in **Chapter 14: Access, Traffic and Transport**
		Trees that might need to be removed for access purposes should be replaced with replanting of the same species and within the same area as the removal.	Addressed in **Chapter 4: Description of Development**
Findhorn, Nairn and Lossie Fisheries Trust	No	N/A	No response required
Findhorn Salmon Fishery Board	No	N/A	No response required
Forestry Commission Scotland	No	N/A	No response required
Grantown-on-Spey & Vicinity Community Council	Y – 3rd June 2013	Visualisation should be produced to THC visualisation standards.	Addressed in **Chapter 7: Landscape and Visual**
		The Council advised that a number of viewpoints should be amended and additional visualisations points should be established, in order to provide better results.	
Health and Safety Executive	No	N/A	No response required
Highlands and Islands Airports Limited	Y – 3rd June 2013	HIAL advised that the Proposed Wind Farm Development falls within the safeguarded areas for Inverness Airport and any operational turbine in this area would likely affect the Inverness aeronautical navigation aids (radar).	Addressed in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**
Highland Raptor Study Group	No	N/A	No response required
John Muir Trust	No	N/A	No response required
The Joint Radio Company (JRC) Limited	Y – 7th May 2013	JRC does not foresee any potential problems based on known interference scenarios and data provided	Noted
Marine Scotland Science Freshwater Laboratory (MSSFL)	Y – 13th June 2013	EIA should address potential for adverse impacts on water quality and fish populations in these areas; ▪ increased sediment transport and deposition ▪ pollution incidents ▪ altered hydrological pathways ▪ removal or degradation of fish habitat, including spawning areas ▪ reduction in food supply and obstruction to upstream and downstream migration of fish It is recommended that the scheme be designed to avoid;	Addressed in **Chapter 11: Geology, Hydrology and Hydrogeology**, **Chapter 5: Construction and Decommissioning** (peat slide risk) and a full assessment of impacts on ecology is presented in **Chapter 8: Ecology.**

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
		▪ water bodies and stream crossings with a 50 m buffer to streams from construction areas ▪ peat disturbance, risk of peat slide should be assessed ▪ abstraction and discharge of water ▪ pollution, both diffuse and point incidence, notify SEPA of any risk ▪ avoidance of exacerbating local acidification issues in the area ▪ potential impacts of tree felling on the aquatic environment. The combined effect on water quality and fisheries from all existing and proposed construction developments in the area should be addressed in the ES in addition to angling, as a recreation interest, and the impact that the proposed development may have on it. Best practice should be followed and risks and mitigation measures and assessment methods should be detailed in the ES. It is the responsibility of the developer to provide data on the distribution, species and abundance of fish within and around the development site to allow MSS-FL to assess levels of risk from the proposed development. It is the responsibility of the developer to provide a clear and honest assessment of the risks posed to fish populations as a result of the proposed development. If there is any reasonable doubt as to the potential impacts a monitoring plan should be put in place to assess impacts and allow remedial action at the earliest opportunity. Monitoring plans should be clearly defined and justified and must tie into site management	
Moray Council (MC)	Y – 17th June 2013	The Proposed Wind Farm Development should acknowledge and take into account the Moray Development Plan.	Addressed in **Chapter 2: Planning and Policy Context**
		Supplementary Planning Guidance and Material Considerations should be taken under consideration, which identify potential cumulative issues and constraints. These include: ▪ Supplementary Planning Guidance: Moray Onshore Wind Energy (2013); and ▪ Moray Wind Energy Landscape Capacity Study (2012)	Addressed in **Chapter 2: Planning and Policy Context** and **Chapter 7: Landscape and Visual**
		The ES should address potential resultant impacts/effects in landscape and visual terms and other adverse impacts that may occur.	Addressed in **Chapter 7: Landscape and Visual**
		The Proposed Wind Farm Development should be assessed against the MLCS in order to demonstrate how this proposal will integrate with and not detract from the Moray landscape.	
		At present there is no formally constituted community council within TMC area for the locality immediately adjoining and to the east of the proposed wind farm development. For other developments TMC has previously advised applicants to consult with any Community Council that may be established with an interest in planning matters in this area of Moray.	The main community association representing the area within Moray is Edinkillie Community Association, which was included in the scoping consultation and community consultation, as detailed in this chapter.
		TMC to be included in cumulative wind farm list consultation.	The list of proposed developments to be included in the cumulative landscape and visual assessment and the final list of viewpoints for the LVIA and CLVIA was sent to THC, TMC, SNH, CNPA and ECDU.
		The environmental effects of the proposed wind farm can only be established and assessed within the ES once full details of the development are available and known. Where cabling is required, to effect connections to any sub-station or national grid, both within the site and off-site, these should be undergrounded with details of the routing of cabling included in the submission. The access arrangements between the site and the	Addressed in **Chapter 4: Description of Development**

Table 6.1: Scoping Consultation

	Response Received?	Issues Raised	Where in the ES is this Addressed?
		public road should also be included within the submission together with details of all required/proposed road upgrades and improvement works both on- and off-site, and all measures required/proposed to mitigate the environmental impacts of these works. Both the ES (and the formal submission) should present a comprehensive and complete account of the proposed development.	
		The Opinion should confirm the requirement to consult with TMC's Environmental Health Service to identify nearest noise sensitive (residential) property and agree noise impact assessment locations within Moray, and to agree the scope of the required/proposed noise impact assessment including the methodology (using ETSU principles) and the setting of agreed noise limits.	The Applicant provided details of the proposed noise impact assessment and assessment locations to TMC's Environmental Health Officer, as detailed in **Chapter 12: Noise**.
		In terms of viewpoint selection, the Council's previous response has been partially addressed. Points which have not been included are on the A96 near Forres, and Culbin Forest viewing tower, Forres.	It has not been considered necessary to include these additional viewpoints for the reasons set out below. The A96 near Forres: There will be visibility from the A96 near Forres, although roadside trees and local screening affects some views. Views from this and similar locations on the coastal lowlands looking inland can be represented by viewpoints included in the assessment. The viewpoint at Califer provides a similar, although slightly more elevated view inland, and visualisations generated for Findhorn can also be used to represent the views from around Forres. The visual effects on the settlement of Forres and the A96 route are assessed in the LVIA separately. Culbin Forest Viewing Tower: There will be visibility from the top of the viewing tower that is elevated above the coniferous trees, but this is not a location representative of ground level views, which will be screened by trees for most parts of the Culbin forest area and its surroundings. Views from the tower can be represented by the visualisations for Findhorn, which can be used to represent all low level views from the coastal area around Forres. Elevated views can be represented by the viewpoint at Califer.
		The use of wireframe visualisations only for the additional locations listed is not acceptable to Moray Council, nor consistent with the information requirements within MOWE. The Opinion must confirm that the locations as identified should be subject to a full viewpoint analysis and therefore included within Table 5.2.	The wireframes for the additional locations are produced for information purposes only, and have not been assessed as viewpoints. This is because it is considered that the viewpoints selected are suitable and sufficient to represent the likely visual impacts that the Proposed Wind Farm Development would have on views from the study area, while maintaining a reasonable number of viewpoints. A letter confirming the final list of viewpoints for the LVIA and CLVIA has been sent to THC, TMC, SNH, CNPA and ECDU. The distance to the nearest additional location is 3.5 km, at the Ardclach War Memorial near the A939 (location W1), and the location on the General Wade's Road (location W2) is 5.7 km from the Proposed Wind Farm Development. It is considered that these locations, with views over the Findhorn River Valley towards the Site, can be represented by the viewpoint at Ardclach Belltower (Viewpoint 6) or the B9007 near Mount (Viewpoint 5), for which photomontages are provided. Other additional locations are between 14.7 km from the Proposed Wind Farm Development (W3 at Nairn Sainsbury's) and 36.8 km away (W10 at the Ptarmigan Restaurant on Cairn Gorm). It is considered that for each of the additional locations, there is a viewpoint in the assessment that can be used to represent the view from the additional locations.
		In terms of shadow flicker, the Opinion must confirm the requirement not only to have regard to Scottish Government's online/web-based renewables advice (2011) but also to TMC's MOWE (Section 5) where the required/proposed shadow flicker assessment should demonstrate that shadow flicker is not a problem i.e. that no adverse amenity effects	Addressed in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**

Table 6.1: Scoping Consultation			
	Response Received?	**Issues Raised**	**Where in the ES is this Addressed?**
		occur and that the proposal "provides for a minimum distance equivalent to x10 rotor diameter between all regularly occupied buildings and wind turbine proposals."	
Mountaineering Council of Scotland	Y – 16th May 2013	No comment	No response required
Ministry of Defence (MoD)	Y – 31st May 2013	In the interests of air safety, the MOD requests that the turbines are fitted with aviation lighting.	Addressed in **Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker**
		If planning permission is granted the MoD should be advised of the date construction starts and ends; the maximum height of construction equipment; and the latitude and longitude of every turbine.	
NATS Holdings	Y – 10th May 2013	No comment	No response required
OFCOM	No	N/A	No response required
Office for Nuclear Regulation (ONR)	Y – 10th June 2013	ONR has no comments to make; the site is not located within a nuclear safeguarding area.	No response required
Ramblers Association Scotland	No	N/A	No response required
RSPB Scotland	Y – 29th May 2013	RSPB Scotland agreed with the approach outlined for Ornithology in the Scoping Report.	Addressed in **Chapter 9: Ornithology**
Save Our Dava (SOD)	Y – 10th May 2013	SOD raised issues regarding the viewpoints selected in the Scoping Report. It was proposed that the locations of some of these viewpoints should be amended and a number of other viewpoints should be taken under consideration.	Addressed in **Chapter 7: Landscape and Visual**
Scottish Badgers Group	No	N/A	No response required
Scottish Wildlife Trust	No	N/A	No response required
Scotways	Y – 13th June 2013	The Society brought to the attention of the Applicant a number of public rights of way and other opportunities for recreation and access in the vicinity of the Site.	Addressed in **Chapter 15: Socio-Economics**
		The LVIA should include viewpoints on some or all of the above identified routes.	Addressed in **Chapter 7: Landscape and Visual**
		The Applicant should also consult the Core Paths Plans, prepared by Local Authorities.	Addressed in **Chapter 3: Design Evolution and Alternatives** (regarding road set back distance) and **Chapter 15: Socio-Economics**
		It is advisable to set back all wind turbines a minimum distance, equivalent to the height of the blade tip, from the edge of any public highway (road or other public right of way) or railway line.	
The Crown Estate	No	N/A	No response required
Transport Scotland	Y – response provided to THC and incorporated into the THC Pre- Application Pack – 10th July 2013	Request that a proposed route action plan be included within the EIA, which should include details of measures to mitigate abnormal load movements on the trunk road network.	Addressed in **Chapter 14: Traffic and Transport**
Visit Scotland	No	N/A	No response required

Potentially Significant Issues

6.11 Following consultation, the following key environmental issues associated with the Proposed Wind Farm Development are addressed in the EIA:

- Landscape and Visual;
- Ecology;
- Ornithology;
- Cultural Heritage and Archaeology;

- Geology, Hydrology and Hydrogeology;
- Noise and Vibration;
- Electromagnetic Interference, Aviation and Shadow Flicker;
- Access, Traffic and Transport; and
- Socio-Economics.

Non-Significant Issues

6.12 It was not considered necessary to carry out an air quality impact assessment in relation to air emissions during construction due to the very limited nature of the emissions and the predominate absence of nearby sensitive receptors. Additionally, no borrow pits would be used on the Site. However, mitigation measures to be used during the construction phase which would serve to minimise air emissions are described in Table 5.1 of **Chapter 5: Construction and Decommissioning**.

6.13 A swept path assessment has been undertaken for the abnormal access route to the Site (see **Chapter 14: Access, Traffic and Transport**). This assessment has indicated a number of areas of minor works (e.g. temporary removal of street furniture) which are required to accommodate the abnormal loads. With the exception of improvement works at two locations (the approach to the A96/A939 junction; and on the A939 beside Logie Bridge) the works are considered to be non-significant and have not been assessed further within this ES. Should the Proposed Wind Farm Development be consented, they will be agreed with the relevant roads authorities through a detailed traffic management plan at the pre-construction stage. The improvement works in relation to the two aforementioned locations are considered in **Chapter 14: Access, Traffic and Transport**.

EIA Methodology

6.14 Good practice in EIA is defined in a number of sources (Hakes P, 2007[1]; Carroll B et al, 2003[2]; DCLG, 2006a[3] & b[4]; IEMA, 2004[5] and 2008[6]; Lee et al (1999)[7], European Commission 2001[8]; PAN 1/2013, 1998, Circular 3/20111). The methods followed in this EIA have drawn on these to generate a robust assessment. In line with guidance provided in the EIA Regulations and EIA good practice guides, the EIA process has involved the following:

- consultation and scoping with statutory consultees, non-statutory consultees and the local community to identify the key issues on which the EIA should focus;
- establishing baseline environmental conditions through desktop research and site surveys;
- identifying impacts of the Proposed Wind Farm Development;
- determining how impacts would be avoided or reduced through design evolution or additional mitigation measures;
- assessing the significance of residual environmental impacts on the identified receptors against recognised or defined criteria;
- describing how likely significant future impacts would be monitored (through e.g. conditions attached to a planning consent); and
- reporting the process, results and conclusions of the EIA in an ES.

Consideration of Alternatives

6.15 Both the EIA Directive and the EIA Regulations require that, as part of the information to be provided in an ES, an outline of the main alternatives studied by the developer and an indication of the main reasons for their choice, taking into account the environmental impacts, should be provided. However, there is no requirement in the regulations, for the applicant of a wind farm to demonstrate that there are no alternative sites which would have lesser environmental effects.

6.16 Good practice in EIA (PAN 1/2013) clarifies this point. It explains that the EIA Regulations do not require applicants to 'invent' an alternative where none has been considered, although the lack of alternatives should be explained. It goes on to accept that alternatives would be constrained by economic and operational reasons, and that the competent authority should consider an application on its merits and not on the merits of potential alternatives (although for some applications, the existence or otherwise of feasible alternatives might be a material consideration). **Chapter 3: Alternatives and Design Evolution** therefore summarises the alternatives to the Proposed Wind Farm Development considered by the design team, including the site selection process and the consideration of alternative designs through the design evolution process.

Baseline Characterisation

6.17 The purpose of EIA is to predict how environmental conditions may change as a result of a proposed development. This requires that the environmental conditions now and in the future - assuming no development on the Site - are established. These conditions are referred to as the baseline and are usually established through a combination of desk based research, Site survey, and empirical studies and projections. Together these describe the current and future character of the Site and surroundings, and the value and vulnerability of key environmental resources and receptors.

6.18 Making predictions about how parameters such as land use, landscape, views and the wider community may change in the future relies heavily on assumptions about future development and environmental trends and is at risk of being wholly hypothetical and subjective. For this reason, where development is not proposed in the vicinity for a future baseline to be

[1] Hakes P (2007) The Essex Guide to Environmental Impact Assessment

[2] Carroll B and T Turpin (2003) Environmental Impact Assessment Handbook: A Practical Guide for Planners, Developers and Communities

[3] Department for Communities and Local Government (2006a) Environmental Impact Assessment: A Guide to Good Practice (Consultation Paper)

[4] Department for Communities and Local Government (DCLG) (2006b) Amended Circular on Environmental Impact Assessment (Consultation Paper)

[5] Institute of Environmental Management and Assessment (2004) Guidelines for Environmental Impact Assessment

[6] Institute of Environmental Management and Assessment (2008) ES Review Criteria

[7] Lee N, R Colley, J Blonde and J Simpson (1999) EIS Review - Reviewing the quality of Environmental Statements and Environmental Appraisals

[8] European Commission (2001) Guidance on EIA

addressed, the baseline adopted for EIA is normally taken as the current character and condition of the Site and surrounds, and the likely significant environmental impacts of the development are then assessed in the context of the current conditions alone. Each technical assessment acknowledges the likely future baseline situation in relation to that topic. In addition, each topic includes consideration of the other wind energy developments, as discussed under Cumulative Impacts below.

Identification of Impacts

6.19 Each technical chapter contains a section that identifies the likely significant effects on the environment that may arise as a result of the construction and/or operation of the Proposed Wind Farm Development. Impacts may be direct, indirect, secondary or cumulative. Within these categories, they may also be short, medium or long-term, permanent or temporary, positive or negative. Direct (or Primary) impacts are changes to the baseline arising directly from activities that form part of the development, for example a localised increase in noise during construction. Indirect (or Secondary) impacts are those that arise as a result of a direct impact, for example deterioration of water quality in a watercourse due to a discharge could have secondary impacts on aquatic biodiversity. Cumulative impacts occur when a receptor is subject to multiple impacts, either of the same nature from different developments, or of different types but caused by the same development. Cumulative impacts are discussed further below. In this report the terms impacts and effects are used interchangeably.

Cumulative Impacts

6.20 In accordance with the web-based renewable energy guidance[9] which has replaced PAN 45[10], likely cumulative impacts have been defined as the likely impacts that the Proposed Wind Farm Development may have in combination with developments which are subject to valid applications for consent, consented, under construction or operational. A full list of the developments that have been considered as part of the cumulative assessment are provided in Table 6.2 below; however it should be noted that the specific developments which are included within the cumulative impact assessment varies from one technical chapter to another according to the particular potential impacts which are under consideration - for example all of the cumulative schemes are assessed within **Chapter 7: Landscape and Visual**, however this approach is not appropriate for e.g. **Chapter 8: Ecology** due to the potential ecological receptors being much more localised. The rationale for the cumulative developments included in the assessments is explained within each technical chapter.

Table 6.2: Cumulative Wind Farm Sites[11]

Name	Number of Turbines	Tip Height (m)	Approximate distance to Cairn Duhie (between closest turbines) (km)	Status
Hill of Glaschyle	12	99.5	6.5	Application submitted
Logie Home Farm[12]	1	34.38	8.1	Consented
Berryburn	29	104	8.4	Under construction
Paul's Hill Phases 1&2	28	100	12.3	Operational
Tom nan Clach	17	110	12.5	Consented
Cluny Farm	1	61	13.8	Consented
Bognie Farm	1	61	14.8	Operational
Moy	20	126	17.5	Consented
Rothes Phases 1	22	100	19.4	Operational
Rothes Phase 2	18	125		Under construction
Kellas	8	110	20.6	Application submitted
Findhorn	4	44	21.5	Operational
Hunthill	4	67	25.4	Consented
Farr	40	101	25.8	Operational
Glen Kyllachy	20	110	26.2	Application submitted
Fearndearne	1	55.7	32.1	Appeal/Public inquiry
Allt Duine	31	125	33.0	Appeal/Public inquiry
Dorenell	59	126	34.8	Consented

6.21 Due to the nature and scale of the Proposed Wind Farm Development, cumulative landscape and visual impacts, noise impacts, historic environment impacts, ecological and ornithological impacts, and impacts from traffic and access arising from other wind farms in the vicinity of the Proposed Wind Farm Development have all been considered in the respective assessments. No other potentially significant cumulative impacts have been identified and therefore only the aforementioned cumulative impacts are assessed in this ES.

Approach to Mitigation

6.22 In the hierarchy of mitigation, likely significant adverse effects should in the first instance be avoided altogether, then reduced and finally where possible offset (IEMA 2004).

6.23 Adverse effects are best avoided through design, and the iterative nature of EIA can help to inform the development of the design process. In this case, the EIA and the design processes

[9] Scottish Government – Renewable Energy Guidance online – http://www.scotland.gov.uk/Topics/Built-Environment/Planning/National-Planning-Policy/themes/renewables

[10] Scottish Government (2002) Planning Advice Note 45: Renewable Energy Technologies

[11] This list includes all wind turbine developments greater than 50 m tip height within 35 km of the outermost turbines of the Proposed Wind Farm Development, and all wind turbine developments greater than 50 kW capacity within 10 km of the outermost turbines.

[12] Please note that this project is assessed within the cumulative noise assessment (as it is above 50 kW); however, it is not included within the cumulative landscape and visual assessment (as it is below 50m tip).

have been combined. The baseline assessment informed the initial framework of the Proposed Wind Farm Development; then as the scheme developed, likely significant environmental effects were identified and the proposals refined to mitigate likely significant environmental effects.

6.24 Mitigation measures to prevent, reduce and, where possible, offset any significant adverse effects on the environment could also be implemented during the construction phase or once the Proposed Wind Farm Development is completed. Where the assessment of impacts (see below) draws on mitigation that would be implemented in the future, a commitment would be given by the Applicant to implement the mitigation measures set out in the relevant technical chapter. A summary of all mitigation commitments is included in Chapter 16: Summary.

Assessment of Impacts

Significance

6.25 The assessment of the significance of environmental effects is important in that it informs the determination by the competent authority of the overall acceptability of a proposal. Determining significance is frequently one of the more contentious elements of the EIA process in that it uses not only predictive tools and assessment criteria, but also expert interpretations and value judgements.

6.26 It is possible to consider the likely significance of environmental effects with and without mitigation measures in place. In the absence of clear guidance within EIA practice on how to approach this issue, this EIA adopts an approach that reflects how the Proposed Wind Farm Development has responded to environmental constraints and opportunities in its design and how it envisages responding to issues through construction and operation. Likely significant environmental effects have therefore been identified first, based on an understanding of the Site and the general form of the Proposed Wind Farm Development. A description of the mitigation measures incorporated into the design, and envisaged for the construction and operation stages of the Proposed Wind Farm Development, is then provided. Finally, residual impacts, i.e. those that remain following the implementation of mitigation, are then assessed to demonstrate how the mitigation has been effective at avoiding, reducing or offsetting likely significant environmental effects.

6.27 The significance of environmental effects in EIA is typically assessed by considering both the character of the change (i.e. the size and duration of the impact) and the value/sensitivity of the environmental resource that experiences this impact (i.e. the receptor).

6.28 Impacts and receptors have been described using quantitative criteria wherever possible using those listed below. Where different terminology has been used, this is stated clearly in the relevant chapter.

- the nature of the impact, described as adverse, neutral or beneficial;
- the magnitude of the impact, based on a scale of major, moderate, slight, negligible and unknown;
- the likelihood of the impact occurring, based on a scale of certain, likely or unlikely;
- the duration of the impact, based on a scale of long, medium and short term;
- the reversibility of the impact, being either reversible or irreversible;
- the value of the receptor, based on a scale of international, national, regional, local and negligible;
- the sensitivity of the receptor to the impact, based on a scale of high, medium and low and in some instances negligible; and
- the occurrence of the impact during the phased implementation of the Proposed Wind Farm Development.

6.29 Each of the technical chapters provides the specific criteria, including sources and justifications, for quantifying the different levels of impact. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations to establish to what extent an impact is environmentally significant.

6.30 Within each technical chapter, overall effects are described as Major, Moderate, Minor or Negligible. Moderate or major effects are considered significant in terms of the EIA Regulations; minor or negligible effects are considered not significant.

Phasing

6.31 In relation to phasing, the likely significant effects arising from construction, operation and decommissioning have been assessed individually in each chapter, where appropriate. **Chapter 5: Construction and Decommissioning** provides a detailed breakdown of project phasing.

Assumptions and Limitations

6.32 The principal assumptions that have been made, and any limitations that have been identified, in undertaking the EIA, are set out below. Assumptions specifically relevant to each topic have been set out in the relevant chapter:

- the assessments contained within each of the technical chapters are based upon the application drawings and plans submitted as part of the application (refer to **Chapter 4: Description of Development** for a list of the relevant drawings);
- baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions may change during the construction and operation of the Proposed Wind Farm Development;
- the assessments contained within each of the technical chapters are based upon all of the principal existing land uses adjoining the Site remaining substantially unaltered;
- construction works across the Site would take place in accordance with the description in **Chapter 5: Construction and Decommissioning**;

- the design, construction and completed development would satisfy environmental standards consistent with contemporary legislation, practice and knowledge as a minimum, but would strive to achieve best practice; and
- a draft Construction and Decommissioning Method Statement (CDMS) is presented in **Technical Appendix 5.1**. The draft CDMS would be discussed and agreed with ECDU and THC and other stakeholders at a later date, if consent is granted; the enforced and monitored during all key stages of the works.

The Environmental Statement

Content of the ES

6.33 The required content of the ES is set out in Schedule 4 of the EIA Regulations. Table 6.3 presents these requirements and indicates where in this ES the requirements have been met.

Table 6.3: Information Which is Required in an ES (Schedule 4 of the EIA Regulations)

	Required Information	Section of ES
Part 1		
1	Description of the development, including in particular:– ▪ a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases; ▪ a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; and ▪ an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the development.	**Chapter 4: Description of Development and Chapter 5: Construction and Decommissioning** provide these details.
2	A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.	Technical Chapters 7 – 15 provide these details, particularly in the Baseline Conditions section.
3	A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from: ▪ the existence of the development; ▪ the use of natural resources; ▪ the emission of pollutants, the creation of nuisances and the elimination of waste; and ▪ the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.	Technical Chapters 7 – 15 provide these details, particularly in the Potential Impacts and Impact Assessment sections.
4	A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	Technical Chapters 7 – 15 provide these details, particularly in the Mitigation section.
5	A Non-Technical Summary (NTS) of the information provided under paragraphs 1 to 4 of this Part.	This is published as Volume 1 of the ES.
6	An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information.	Technical Chapters 7-15 provide these details where relevant.
Part 2		
1	A description of the development comprising information on the site, design and size of development.	Chapter 4: Description of Development.
2	A description of the measures envisaged in order to avoid, reduce, and, if possible remedy significant adverse effects.	Mitigation section in Chapters 7-15.
3	The data required to identify and assess the main effects which the development is likely to have on the environment.	Methodology section in Chapters 7-15
4	An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects.	**Chapter 3: Design Evolution and Alternatives provided these details.**

Technical Chapters

6.34 As described in Chapter 1: Introduction a consistent approach to the presentation of EIA findings in the ES has been adopted for each of the technical areas, including:

- an explanation of the information gathering and assessment methodology, including a review of policy and legislative requirements of relevance to the specific technical area;
- a description of the baseline conditions;

- a description of the mitigation measures that have been incorporated into the Proposed Wind Farm Development through its design and for its construction and operation;
- the identification of the likely significant impacts arising during the construction and operation phases of the Proposed Wind Farm Development; and
- an assessment of the likely significant environmental effects these impacts are expected to cause and an evaluation of their significance against defined criteria.

6.35 Accordingly, the technical chapters (Chapters 7 - 15) adopt the following structured approach:

- Introduction;
- Legislation and Policy Context;
- Issues Identified During Consultation;
- Assessment Methodology;
- Baseline Conditions;
- Potential impacts
- Mitigation;
- Assessment of Residual Impacts;
- Summary; and
- References.

Good Practice

6.36 As with EIA, good practice in the preparation of the ES is defined in a number of sources, with more specific issues covered by ES review checklists. Many of these checklists are very detailed and go to some length. In terms of widely applicable and practical guidance, the recent IEMA Quality Mark scheme provides best practice review criteria against which all ESs are evaluated. Table 6.4 therefore reproduces the IEMA Quality Mark ES Review Criteria, along with a description of how these indicators have been met by this ES.

Table 6.4: IEMA Quality Mark ES Review Criteria

Required Information	Section of the ES
EIA Commitment 1: Regulatory Compliance	
a) Does the ES, in the light of the project being assessed, identify, describe and assess effects on: ▪ Human Beings; ▪ Fauna & Flora; ▪ Soil; ▪ Water; ▪ Air; ▪ Climate; ▪ Landscape; ▪ Cultural Heritage; and ▪ Material Assets.	Technical Chapters 7-15 provide these details.
b) Does the ES attempt to set out the interaction between the factors set out under criteria 1a)?	Secondary, Indirect and cumulative effects are covered in Chapters 7 to 15.
c) Does the ES contain a clear section, or sections, providing a description of the project comprising information on the site, design and size of the project?	This is set out in **Chapter 4: Description of the Development**.
d) Does the ES contain a section, or sections, that describes the likely significant effects of the proposed project on the environment?	Technical Chapters 7-15 provide these details.
e) Does the ES contain a clear section, or sections, that provides a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects?	Technical Chapters 7 – 15 provide these details. All mitigation commitments are summarised in Chapter 16.
f) Does the ES contain a clear section, or sections, that provides the data required to identify and assess the main effects which the project is likely to have on the environment?	Technical Chapters 7-15 provide these details.
g) Does the ES contain a section, or sections, that outline the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects?	This is set out in **Chapter 3: Design evolution and alternatives**.
h) Has a Non-Technical Summary (NTS) been produced containing an outline of the information mentioned in 1c) to 1h)?	Volume 1 contains the NTS.
EIA Commitment 4: EIA Context	
A) Scoping	

Table 6.4: IEMA Quality Mark ES Review Criteria	
Required Information	**Section of the ES**
i) Has the ES clearly stated what effects will be addressed and how this decision was reached?	A separate scoping report has been produced and summarised, along with scoping responses in Chapter 6 of the ES.
ii) Are the main environmental concerns and their locations, where relevant, clearly identified with an explanation of the risks posed from the project? Including relevant environmental issues beyond the boundary of the proposal?	Technical Chapters 7-15 provide these details.
iii) Does the ES identify the environmental issues that will not be assessed and explain why they are not being considered further?	The section in **Chapter 6: Scoping and Consultation Responses** clearly defines and explains those issues not given further consideration.
iv) Is the sub-topic scope undertaken in relation to each of the topics included in the EIA appropriate and focussed?	Technical Chapters 7-15 provide these details
B) Alternatives, including iterative design	
i) Does the ES set out the main alternatives that were considered at different points during the development of the proposal?	This is set out in **Chapter 3: Design Evolution and Alternatives**
ii) Are the main reasons for the selection of the proposal over distinct alternatives and design iterations easily identifiable?	This is set out in **Chapter 3: Design Evolution and Alternatives**
iii) Does the ES clearly indicate how the EIA process, environmental issues and consultee responses influenced the iterative design process that led to the proposed project?	This is set out in **Chapter 3: Design Evolution and Alternatives** and the Technical Chapters 7-15.
EIA Commitment 5: EIA Content	
A) Baseline	
i) Does the ES describe the current condition of those aspects of the environment that are likely to be significantly affected by the development?	Technical Chapters 7-15 provide these details.
ii) Is the sensitivity / importance of the baseline environment clearly evaluated?	Technical Chapters 7-15 provide these details
iii) Are limitations in the baseline information identified and clearly set out?	Technical Chapters 7-15 provide these details
B) Assessment	
i) Are the methods for establishing the magnitude of impacts on the receiving environment clearly defined?	Technical Chapters 7-15 provide these details.
ii) Does the ES set out a generic methodology for the assessment and evaluation of significance OR clearly explain and justify a specific method for each environmental issue?	Generic method is set out with Chapter 6. Detailed method of each subject area I set out with Technical Chapters 7 -15.
iii) Does the assessment of significance consider the impact's deviation from the established baseline condition? (E.g. the sensitivity of the environment, the extent to which the impact is reversible, etc.)	Technical Chapters 7-15 provide these details.
iv) Does the ES identify the significance of impacts that would be anticipated to remain following the successful implementation of any mitigation set out in the ES?	Technical Chapters 7-15 provide these details
vii) Does the ES give appropriate prominence to both positive and negative effects relative to their significance?	Chapter 1 provides details of the equivalent number of homes for which the proposed wind farm would generate electricity and **Chapter 4: Description of Development** provides details of the carbon payback period. Technical Chapters 7-15 provide details of the predicted positive and negative effects of the Proposed Wind Farm Development.
C) Environmental Management	
i) Does the ES describe the measures proposed to be implemented to avoid, reduce, and if possible, remedy significant adverse impacts of the proposed development?	Chapter 16 summarises all the mitigation requirements set out within the ES.
ii) Is an indication of the effectiveness of the stated mitigation measures provided?	Chapter 16 summarises all the mitigation requirements set out within the ES, including a statement on effectiveness.
iii) Are details provided related to any management plans that the ES indicates should be implemented to deliver the mitigation measures and/or monitor the environmental impact of the project?	**Technical Appendix 5.1** (Draft CDMS) provides details of a series of management plans required to provide mitigation pre- during and post construction. **Technical Appendix 8.7** (Outline HMP) provides details of proposed ecological enhancement measures

Table 6.4: IEMA Quality Mark ES Review Criteria	
Required Information	**Section of the ES**
iv) Does the ES identify the general groups who will be responsible for the follow-up programme?	**Technical Appendix 5.1** (Draft CDMS) sets out responsibilities.
EIA Commitment 6: EIA Communication	
A) Consultation	
i) Does the description of any consultation include details of those who were contacted, including statutory and non-statutory consultees, and the public?	Summary of all consultations is set out in Chapter 6. Full consultation responses are included in **Technical Appendix 6.1**. In addition, a Consultation Report will be submitted with the consent application.
ii) Does the main text of the ES provide a summary of the main issues raised by consultees?	Chapter 6 provides a summary of consultee responses and how they have been addressed.
iii) Does the ES set out if any of the issues raised by consultees will not be dealt with in the ES?	Chapter 6 provides a summary of consultee responses and how they have been addressed.
If so is clear justification set out as to why the issue has been scoped out?	Chapter 6 provides a summary of consultee responses and how they have been addressed.
B) ES Quality	
i) Does the ES provide appropriate illustrations through the use of maps and/or diagrams? In particular this should cover:	
the location of the site, site layout and boundary;	Figures appended to Chapters 1 & 4.
▪ operational appearance;	Figures appended to Chapter 4, plus photomontages within Volume 3: Landscape and Visual Figures.
▪ main environmental receptors; and	Figures appended to Chapters 7-15, plus figures contained with Volume 3: Landscape and Visual Figures.
▪ impacts displayed in a visual format where appropriate.	Figures appended to Chapter 7-15, plus figures contained within Volume 3: Landscape and Visual Figures.
ii) Is the area of proposed land clearly described and indicated on an appropriate map or diagram?	Figures appended to Chapter 1&4, and Chapters 7-15.
iii) Are the anticipated timescales of construction, operation and (where appropriate) decommissioning of the proposal clearly set out in the main text?	Chapter 5 provides details of the Construction programme.
iv) Is the information in the ES presented in a manner in which a non-specialist would be able to logically identify information they were seeking?	A clear structure of the ES is presented within the preface.
v) Are technical terms kept to a minimum, with a glossary provided?	A Glossary is provided immediately after the contents page in Volume 2 of the ES.
C) Non-Technical Summary (NTS)	
i) Does the NTS provide sufficient information for the non-specialist reader to understand the main environmental impacts of the proposal without reference to the main ES?	Volume 1 comprises the NTS and outlines all the significant environmental impacts in a way that a non-specialist reader would understand.
ii) Are maps and diagrams included in the NTS that, at a minimum, illustrate the location of the application site, the footprint of the proposed development, and the location of relevant key features?	Volume 1 comprises the NTS and includes figures illustrating the application site boundary and layout and the location of relevant key features.
iii) Is it clear that the NTS was made available as a separate, stand-alone document to facilitate a wider readership?	The NTS is provided as a standalone document (Volume 1 of the ES) in order to provide sufficient information to the non-specialist reader, regarding the Site itself and potential significant effects that may be caused due to the construction, operation and/or decommissioning of the Proposed Wind Farm Development.

7 Landscape and Visual

Introduction

7.1 This chapter considers the potential impacts[1] of the Proposed Wind Farm Development on the landscape and visual resources of the Site and surroundings, during the construction operational and decommissioning phases of the project.

7.2 This chapter should be read in conjunction with **Chapter 3: Design Evolution and Alternatives, Chapter 4: Description of Development, Chapter 5: Construction and Decommissioning, Chapter 8: Ecology, Chapter 10: Cultural Heritage and Archaeology and Chapter 15: Socio-Economics**. Planning policies of relevance to this assessment are discussed in **Chapter 2: Planning Policy Context** and Technical Appendix 7.1.

7.3 This chapter is supported by figures contained in Volume 3, and Technical Appendices contained in Volume 4.

7.4 The Study Area for the assessment was defined as 35 km from the outermost turbines[2] of the Proposed Wind Farm Development in all directions, as recommended in current guidance for turbines of 100 m to blade tip or higher[3], and in agreement with consultees Scottish Natural Heritage (SNH), The Highland Council (THC), Moray Council and the Cairngorms National Park Authority (CNPA). The Site is shown on Figure 1.1: Site Location and Figure 1.2: Site Boundary, and the Study Area is shown on Figure 7.1: Zone of Theoretical Visibility (ZTV) to Turbine Tip Height (110 m).

7.5 To consider cumulative impacts of the Proposed Wind Farm Development in relation to other schemes in the wider area, wind farms within 35 km of the Proposed Wind Farm Development have been included for the purposes of modelling and detailed assessment, as agreed with SNH, THC, Moray Council and the CNPA. A review of patterns of development is also provided for wind farms in the wider area, extending to 60 km, following guidance from SNH[4].

7.6 The assessment has been undertaken by chartered Landscape Architects at LUC.

Impacts Assessed in Full

7.7 Impacts on the landscape include physical changes to the landscape as well as changes in landscape character. They may also include impacts on areas designated for their scenic or landscape qualities, at a national or local policy level.

7.8 Impacts on visual amenity relate to changes in views, and the appearance and prominence of the Proposed Wind Farm Development in those views.

7.9 Impacts on landscape and visual receptors also include changes in relation to the interaction between the Proposed Wind Farm Development and other existing or proposed wind farms (cumulative impacts).

7.10 The key objective of the assessment is to identify and assess the likely significant landscape and visual impacts of the Proposed Wind Farm Development. This emphasis on identifying significant impacts is supported by current EIA regulations and guidance[5], and so these are assessed in full.

Impacts Scoped Out

7.11 On the basis of the desk based and field work undertaken, initial assessment, the professional judgement of the LVIA and EIA teams, experience from other relevant projects and policy guidance or standards, the following have been 'scoped out' (in agreement with statutory consultees):

- Impacts on receptors beyond 35 km from the Site, where it is judged that potential significant impacts are unlikely to occur, and with the exception of appropriate consideration of cumulative and sequential impacts;
- Locations where receptors are unlikely to be affected by the Proposed Wind Farm Development, through having minimal or no predicted visibility, as predicted by the Zone of Theoretical Visibility (ZTV) mapping (Figures 7.1a – i and Figure 7.2); and
- Cumulative wind farm developments with turbines of less than 50 m to bade tip, with the exception of the existing development at Findhorn.

Issues Identified During Consultation

7.12 Consultation was carried out regarding the selection of viewpoints, methodology and cumulative developments for the Landscape and Visual Impact Assessment (LVIA) and Cumulative Landscape and Visual Impact Assessment (CLVIA), in addition to the scoping consultation. Consultees included THC, SNH, Moray Council and CNPA. Given the overlap between the need for visualisations from assets of cultural heritage value, consultation was also undertaken with Historic Scotland and THC regarding viewpoints for the cultural heritage assessment contained in Chapter 10: Cultural Heritage and Archaeology. Issues identified during consultation, and how and where in this Chapter these issues are addressed, are set out in Table 7.1: Issues Identified during Consultation.

[1] The term 'impacts' is used to refer to the predicted results of the introduction of the Proposed Wind Farm Development. This is used to maintain consistency with other chapters in the Environmental Statement, and is used as an equivalent alternative to the term 'effects', as defined in Landscape Institute and the Institute of Environmental Management & Assessment (Third Edition, 2013) Guidelines for Landscape and Visual Impact

2 The Study Area is defined from the outermost turbines, as these components of the development are the only components likely to be visible beyond 15-20km.

3 Scottish Natural Heritage (2006) Visual Representation of Windfarms: Good Practice Guidance

4 SNH (2012) Assessing the Cumulative *Effects of Onshore Wind Energy Developments*

[5] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) and Landscape Institute and the Institute of Environmental Management & Assessment (Third Edition, 2013) *Guidelines for Landscape and Visual Impact*).

Table 7.1: Issues Identified during Consultation

Consultee	Issue	Where/How this is addressed
The Highland Council	Initial consultation regarding viewpoint selection: Agreed to initial viewpoint selection (Sept 2012) and later revisions following scoping.	Comments considered when finalising viewpoint list
	Scoping: Viewpoints should be discussed with THC and SNH. THC drew attention to THC Visualisation standards and provided advice regarding colouring of cumulative schemes in visualisations and maps. Cumulative assessment required.	THC and SNH were involved at all stages of the discussions regarding viewpoints. THC Visualisation Standards[6] have been used; a cumulative assessment has been undertaken. Cumulative visualisations are provided with prescribed colouring.
	Additional consultation regarding cumulative developments: Advised research on THC website (Sept 2012). Pre-application meeting advice that the cumulative study should not be restricted to 35 km.	Cumulative list fully updated in August 2013, with reference to THC planning website. The cumulative assessment considers patterns of development across an area of radius 60 km.
Scottish Natural Heritage (SNH)	Initial consultation regarding viewpoint selection: Stated that with limited initial information provided, only comment was that a viewpoint to represent impacts on Drynachan, Lochindorb and Dava Moors Special Landscape Area (SLA) was desirable (Oct 2012).	Four viewpoints in the initial selection are located within the Drynachan, Lochindorb and Dava Moors SLA, however, a further viewpoint on Carn Allt Laoigh (NH 922 312) was included for consideration.
	Scoping: key issues identified included impacts on the surrounding landscape and visual amenity, and cumulative impacts.	Impacts on local landscape and visual receptors are assessed, and a cumulative assessment has been undertaken.
	No further comments on additional consultation regarding scope of cumulative assessment and wind farms to be considered.	
Moray Council	Initial consultation regarding viewpoint selection: Drew attention to Landmark Hills listed in SPG[7].	Moray Landmark Hills were reviewed (see Technical Appendix 7.3. Knock of Braemoray, Carn Kitty and Mill Buie were included as viewpoints (Viewpoints 3a, 12 and 14 respectively). An additional wireframe was provided for Ben Rinnes (Wireframe 6, Technical Appendix 7.4).
	Scoping: Drew attention to the Moray Wind Energy Landscape Capacity Study[8], potential impacts on the A940 route into Moray and cumulative impacts of concern. Two additional viewpoints, on the A96 near Forres and Culbin Forest viewing tower. Viewpoints to be agreed with THC, SNH, CNPA and Moray Council. Sequential views from the Dava Way, A940, B9007 and A96 should be assessed. Wireframes are considered not to be sufficient on their own for additional locations, and impacts should be assessed.	Landscape information contained in the Moray Wind Energy Landscape Capacity Study has been used for the assessment. Sequential routes have been assessed. Viewpoints were considered acceptable by a Moray Council Officer prior to Scoping, the additional viewpoints requested at Scoping have been further discussed with Moray Council. The additional viewpoints on the A96 near Forres and Culbin Forest viewing tower are considered by the project team to be sufficiently represented by the visualisations selected, including the visualisation for Califer (Viewpoint 16) and Findhorn (Wireframe 4, Appendix 7.4). Additional wireframes are produced for information purposes only, and are not assessed as viewpoints. This approach was agreed with THC.
	Additional consultation regarding scope of cumulative assessment and wind farms to be considered: noted that Brownmuir Wind Farm has been withdrawn.	Brownmuir Wind Farm was removed from the assessment.
Cairngorms National Park Authority	Initial consultation regarding viewpoint selection: Requested photographs from mountain summits within National Park.	The provision of visualisations was discussed and it was agreed that wireframes would be acceptable for locations beyond Carn Allt Laigh (Viewpoint 13) and the Hills of Cromdale (Viewpoint 17), including Meall a Buachaille (Wireframe 8, Technical Appendix 7.4), Geal Charn (Wireframe 9) and Ptarmigan Restaurant (Wireframe 10).
	Scoping: Raised concern over impact on landscape setting of the National Park. CNP boundary should be shown on ZTVs. Landscape and visual impacts on views from routes out of the Park should be assessed, cumulative impacts should be assessed, special qualities should be assessed. Request for a viewpoint on the A939 near the National Park boundary, consideration of impacts on the A939 and B9007, and a cumulative wireframe from Ptarmigan Restaurant on Cairngorm.	The impacts on the National Park, its special qualities and its landscape setting are considered in the assessment. The boundary is shown on the figures. Landscape and visual impacts on routes are assessed, a viewpoint on the A939 near the Park boundary is used (VP10), and a wireframe from Ptarmigan is provided in Technical Appendix 7.4 (Wireframe 10).

[6] The Highland Council (2013) Visualisation Standards for Wind Energy Developments

7 Moray Council (2013) Supplementary Planning Guidance: Moray Onshore Wind Energy

8 The Moray Council (2012) Moray Wind Energy Landscape Capacity Study

Table 7.1: Issues Identified during Consultation		
Consultee	**Issue**	**Where/How this is addressed**
	No further comments on additional consultation regarding scope of cumulative assessment and wind farms to be considered.	
Historic Scotland	Initial consultation regarding viewpoint selection: Initial list of viewpoints agreed, but requested a detailed ZTV extract for the Lochindorb area to determine a suitable viewpoint location. Location on the flanks of Carn nan Gabhar considered suitable.	A viewpoint above Lochindorb (Viewpoint 11) is assessed.
ECDU	Scoping: A full assessment of the effects on landscape and visual amenity is required, following current guidance. Visual information should be presented in a way which communicates as realistically as possible the actual visual impact of the proposal. Viewpoints should be agreed with the planning authority and SNH. The assessment should consider designated landscapes.	Current guidance for assessment methodology and visualisation production is followed. Viewpoints have been selected following discussions with the planning authority, SNH and other consultees. The implications for designated landscapes are considered.
Grantown-on-Spey Community Council	Scoping: requested that the Lochindorb viewpoint be at the top of the ridge over Carn nan Gabhar, that the Dava Way should be considered, and a wireframe should be provided for Ptarmigan Restaurant on Cairngorm.	Viewpoint 11 is located on the ridge of Carn nan Gabhar, the Dava Way is considered in the assessment, and a wireframe from Ptarmigan is provided in Technical Appendix 7.4 (Wireframe 10).
Edinkillie Community Association	Scoping: Edinkillie CA requested that THC visualisation standards be used, and that impacts on the A940 Whisky Trail and the Dava Way should be considered, as well as cumulative impacts. Edinkillie CA requested that any replanting of trees should use the same species.	THC Visualisation Standards have been used, sequential impacts on the A940 are assessed, and a cumulative assessment has been undertaken. The selection of tree species for replanting would consider existing tree species on the Site (see chapter 4: Description of Development).
East Nairnshire Community Council	Scoping: Requested detailed maps of existing infrastructure for all wind farm sites within 30 km, visualisations from all properties within 2 miles of the Site, and a cumulative assessment.	The LVIA follows current guidance and is focussed on the identification of likely significant impacts. Detailed information relating to infrastructure for distant wind farm is not considered to be necessary to the assessment. The assessment of views from local properties is considered through assessment of impacts from local settlements, routes and viewpoints. A cumulative assessment has been undertaken.
Save our Dava group	Scoping: Comments on the locations of several viewpoints, and suggestions for additional viewpoint locations.	Comments and suggestions have been taken into account in the final viewpoint list, see Technical Appendix 7.3.

7.13 Wireframe images have been provided for ten additional locations across the Study Area, in Technical Appendix 7.4: Additional Wireframes. These locations have been requested through consultation, but are not described in text in the ES. It is considered that the viewpoint selection above provides an adequate representation of the range of significant impacts that the Proposed Wind Farm Development would have.

Assessment Methodology

Introduction

7.14 The key steps in the methodology for assessing both landscape and visual impacts were as follows:

- the landscape of the Study Area was analysed and landscape receptors identified;
- the area in which the Proposed Wind Farm Development may be visible was established through creation of a zone of theoretical visibility (ZTV) covering a distances of up to 35 km from the Site;
- the visual baseline was recorded in terms of the different groups of people who may experience views of the Proposed Wind Farm Development, the places where they would be affected and the nature of views and visual amenity;
- viewpoints were selected (including representative viewpoints, specific viewpoints and illustrative viewpoints), in consultation with THC, SNH, Moray Council and the CNPA;
- likely impacts on landscape and visual resources were identified; and
- the significance of landscape and visual impacts were judged with reference to the sensitivity of the resource/receptor (its susceptibility and value) and magnitude of impact (taking cognisance of the scale of impact, geographical extent and duration/reversibility).

7.15 The assessment is based on the introduction of the Proposed Wind Farm Development as it is described in Chapter 4: Description of Development. Key elements include:

- 20 turbines of 110 m to blade tip;
- Infrastructure including tracks, transformers, met masts, hardstanding areas, compounds and substation infrastructure as described in Chapter 4: Description of Development; and

- A construction phase of approximately 28 months, operation for 25 years, followed by decommissioning.

7.16 Micrositing of turbines (up to 50 m as specified in Chapter 4: Description of Development) is considered unlikely to result in changes to predicted impacts, and therefore would not affect the findings of this assessment.

7.17 The LVIA considers the potential impacts of the Proposed Wind Farm Development on the existing landscape, against a baseline that includes existing wind farms and those under construction. Wind farms subject to planning applications or with planning consent but not yet under construction are considered in the cumulative assessment later in this chapter. Wind farms considered include those that lie within the 35 km Study Area, and which are over 50 m to blade tip height[9].

7.18 The assessment considers the following potential impacts:

- Impacts on landscape and visual amenity during the operational life time of the wind farm;
- Impacts on landscape and visual amenity during the construction and decommissioning phases;
- Cumulative impacts on landscape and visual amenity during the operational phase; and
- Implications for designated landscapes.

7.19 The methodology for the assessment of cumulative impacts (CLVIA) is set out in the cumulative section (paragraph 7.421 onwards).

Assessment Guidance and Data Sources

7.20 The methodology for the landscape and visual assessment is informed by policy and current guidelines. Guidance and data sources used are set out below.

Policy and Guidance

- Scottish Government, 2010. *Scottish Planning Policy*
- Scottish Government, 2012. *Onshore Wind Turbines*
- Scottish Government, 2003. Planning Advice Note (PAN) 68: *Design Statements*
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended)
- The Highland Council (2012) *Highland-wide Local Development Plan*
- The Highland Council (March 2012) *Interim Supplementary Guidance: Onshore Wind Energy*
- The Highland Council (Development Plans
- The Highland Council (Spring 2012) *Inner Moray Firth Local Development Plan: Main Issues Report*
- The Highland Council (2006) *Highland Renewable Energy Strategy and Planning Guidelines*
- Moray Council (March 2013) Moray *Onshore Wind Energy, Supplementary Planning Policy Guidance*
- European Landscape Convention.

Methodology Guidance

- Landscape Institute and the Institute of Environmental Assessment and Management (Third Edition), 2013. *Guidelines for Landscape and Visual Impact Assessment*
- Landscape Institute and the Institute of Environmental Assessment and Management (Second Edition), 2002. *Guidelines for Landscape and Visual Impact Assessment*
- Countryside Agency and SNH, 2002. *Landscape Character Assessment Guidance for England and Scotland*
- Countryside Agency and SNH, 2004. *Topic Paper 6. Techniques and Criteria for Judging Capacity and Sensitivity*
- SNH, 2006. *Visual Representation of Windfarms: Good Practice Guidance*
- Landscape Institute, 2011. *Practice Advice Note, Photography and photomontage in Landscape and Visual Impact Assessment*. Advice Note 01/11
- SNH, 2012. *Assessing the Cumulative Impacts of Onshore Wind Energy Developments*.

Design and Location Guidance

- SNH, 2009. *Siting and Designing Windfarms in the Landscape*
- SNH, 2009. Policy Statement 02/02 *Strategic Locational Guidance for Onshore Windfarms in Respect of the Natural Heritage*.

Designated Areas

- Scottish Natural Heritage, 2010. *The special qualities of the National Scenic Areas*. SNH Commissioned Report No.374
- Structure and Local Plans covering the Study Area (See Legislation and Policy Context)
- THC (2011) Assessment of Highland Special Landscape Areas
- Historic Scotland Inventory of Gardens and Designed Landscapes.[10]

Landscape Character Assessments

- SNH (1998) *Moray and Nairn Landscape Assessment*
- SNH (1998) *Inner Moray Firth Landscape Character Assessment*
- SNH (1996) *Cairngorms Landscape Assessment*
- SNH (1999) Inverness District Landscape Character Assessment
- The Moray Council (2012) *Moray Wind Energy Landscape Capacity Study*

[9] An exception to this is the inclusion of Findhorn Wind Farm (44 m to blade tip) in the assessment.

[10] http://www.historic-scotland.gov.uk/index/heritage/gardens.htm

- Cairngorms National Park Authority (2009) *Cairngorms National Park Landscape Character Assessment*.

Mapping

7.21 Ordnance Survey (OS) Maps:

- Landranger 1:50,000 Scale
- Pathfinder 1:25,000 Scale
- Online map search engines
- British Geological Society, 1979. Geological Map, Solid, North.

Modelling

- Landform Panorama Data at 1:50,000 (containing 3-D contour information at 10m intervals, reported as being accurate to ±3m)
- Raster Data at 1:50,000 (to show surface details such as roads, forest and settlement detail equivalent to the 1:50,000 scale Landranger maps)
- Raster Data at 1:250,000 (to provide a more general location map).

7.22 No data gaps have been identified which would affect the outcome of the assessment. However, the Landscape Character Assessments used as a source of baseline information were found to be variable in their age and detail.

7.23 Field survey work was carried out during several visits under differing weather conditions between April 2012 and August 2013, and records were made in the form of field notes and photographs. Field survey work included visits to the Site, viewpoints and designated landscapes, and extensive travel around the Study Area to consider potential impacts on landscape character and on experiences of views seen from routes.

Visualisations and Modelling

7.24 The methodology for production of the visualisations was based on current guidance[11] and additional requirements as set out by THC (2013). Further information about the approach is provided in Technical Appendix 7.2: Data Sources and Visualisation Methodology.

Assessing Impacts and Significance

7.25 The following sections set out the methodology specific to the type of impact being considered, and describe how the sensitivity ('nature of the receptor', considering both susceptibility and value) and the magnitude of change ('nature of the impact', considering size/scale/extent, duration and reversibility) on each receptor were identified, and used to judge the significance of impact.

Landscape Impacts

Landscape Sensitivity

7.26 Current guidelines state that the nature of landscape receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to the type of change proposed and the value attached to the receptor.

7.27 The nature of the impact on each landscape receptor should be assessed in terms of its size and scale, geographical extent, duration and reversibility.

7.28 These aspects are considered together, to form a judgement regarding the overall significance of impact. The following sections set out the methodology used to evaluate susceptibility, value, size and scale, geographical extent, duration and reversibility.

7.29 For wind energy development, Table 7.2: Criteria to Determine Susceptibility to Wind Turbines is used to evaluate susceptibility of landscape types or character areas.

Table 7.2: Criteria to Determine Susceptibility to Wind Turbines

Characteristic/ attribute	Aspects indicating lower sensitivity to wind energy development	⟷	Aspects indicating higher sensitivity to wind energy development
Scale	Large scale	⟷	Small scale
Landform	Absence of strong topographical variety. Featureless, convex or flat/plateau	⟷	Presence of strong topographical variety or distinctive landform features
Landscape pattern and complexity	Simple Regular or uniform	⟷	Complex Rugged and irregular
Settlement and man-made influence	Presence of contemporary structures e.g. utility, infrastructure or industrial elements	⟷	Absence of modern development Presence of small scale, historic or vernacular settlement
Skylines	Non-prominent /screened skylines Presence of existing modern man-made features	⟷	Distinctive, undeveloped skylines Skylines that are highly visible over large areas or exert a large influence on landscape character Skylines with important historic landmarks
Inter-visibility with adjacent landscapes	Little inter-visibility with adjacent sensitive landscapes or viewpoints	⟷	Strong inter-visibility with sensitive landscapes Forms an important part of a view from sensitive viewpoints
Perceptual aspects	Close to visible or audible signs of human activity and development	⟷	Remote from visible or audible signs of human activity and development

[11] Landscape Institute and the Institute of Environmental Assessment and Management (Third Edition), 2013. *Guidelines for Landscape and Visual Impact Assessment* and SNH (2006) *Visual* Representation *of Windfarms*

7.30 Published landscape capacity or sensitivity studies were reviewed to inform the evaluation of susceptibility of the receptor. The review included an evaluation as to the relevance of the publication to the assessment (e.g. consideration of the purpose and scope of the published studies and whether they have become out of date).

7.31 Judgements on susceptibility of receptors (which may include individual features or areas) are recorded as **high**, **medium** or **low**.

7.32 The value of a landscape is recognised as being a key contributing factor to the sensitivity of landscape receptors and is determined with reference to:

- a review of designations and the level of policy importance that they signify (such as landscapes designated at international, national, local or community level); and
- application of criteria that indicate value (such as landscape quality, scenic quality, rarity, representativeness, conservation interests, recreation value, perceptual aspects, associations e.g. with artists or writers).

7.33 Judgements regarding the sensitivity of landscape receptors combine a consideration of both the susceptibility of the landscape to the type of development proposed and the value attached to the landscape. Judgements are recorded as **high**, **medium** or **low**.

Magnitude of Landscape Impact

7.34 The scale and geographical extent of landscape impacts are measures of the extent of existing landscape elements that would be lost, the proportion of the resource that this represents, the contribution of such elements to the character of the landscape, and the size of the geographical area across which the impacts would be felt. In terms of landscape character, this reflects the degree to which the character of the landscape would change by removal or addition of landscape components, and how the changes would affect key characteristics.

7.35 Size/scale is described as being **large**, **medium** or **small**, and the geographical extent over which the impact would be experienced is considered in terms of whether it would be **widespread** or **localised**, i.e. at a regional or local level, or associated with the more immediate setting of the site.

7.36 Duration is reported as **short term** (0-5 years), **medium term** (5-10 years) or **long term** (over 10 years), as defined in current guidance.[12]

7.37 Reversibility is reported as **permanent**, **partially reversible** or **reversible**.

7.38 Judgements regarding the magnitude of landscape change are recorded as **high**, **medium**, **low** or **barely perceptible** and combine an assessment of the scale and extent of the landscape impact, its duration and reversibility, as indicated in Table 7.3: Magnitude of Landscape Impact.

Table 7.3: Magnitude of Landscape Impact

Magnitude of Landscape Impact	
High	A substantial change in landscape characteristics and/or over extensive geographical area and/or which may result in an irreversible landscape impact.
Medium	A moderate change in landscape characteristics and/or which may be over a large geographical area, and/or which may be reversible over a long duration of time.
Low	A small change in characteristics of the landscape and/or which may be over a relatively localised geographical area, and/or which may be reversible over a short duration of time.
Barely perceptible	A virtually barely perceptible change in characteristics of the landscape and/or which is focused on a small geographical area, and/or which is almost or completely reversible.

Visual Impacts

7.39 Visual impacts are experienced by people at different locations around the Study Area, at static locations (for example viewpoints or settlements) and transitional locations (such as sequential views from routes). Visual receptors are the people who would be affected by changes in views at different places, and they are usually grouped by what they are doing at that place (residents, motorists, recreational users etc).

7.40 Judging the significance of visual impacts requires consideration of the nature of the visual receptors, commonly referred to as their sensitivity, in terms of the susceptibility of the receptor to change in views/ visual amenity and the value attached to particular views. The nature of the impact is assessed in terms of the size and scale, geographical extent, duration and reversibility of the impact.

Sensitivity of the Views and Visual Receptors

7.41 The susceptibility of visual receptors to changes in views/ visual amenity is a function of the occupation or activity of people experiencing the view and the extent to which their attention is focussed on views. This is recorded as **high**, **medium** or **low** according to Table 7.4: Sensitivity of the Receptor: Visual Resource.

7.42 Recognition of the value of a view is determined with reference to:

- planning designations;
- importance in relation to heritage assets (such as designed views recorded in citations of Designed Gardens and Landscapes or views recorded as of importance in Conservation Area Appraisals); and
- indicators of the value attached to views by visitors, for example through appearances in guide books or on tourist maps, provision of facilities for their enjoyment and references to them in literature and art.

[12] Landscape Institute and the Institute of Environmental Assessment and Management (Third Edition), 2013. *Guidelines for Landscape and Visual Impact Assessment*.

Table 7.4: Sensitivity of the Receptor: Visual Resource		
	Higher	**Lower**
Susceptibility of visual receptors to change	Viewers whose attention or interest is focussed on their surroundings, including: ▪ residents occupying properties; ▪ visitors to heritage assets, or other attractions, where the views of the surrounding landscape are important to the experience; ▪ residential communities where views contribute to a valued landscape setting; or ▪ or visiting viewers, whose main focus of outdoor recreational activity is on their surroundings	Working or travelling viewers Viewers whose main focus of activity is not their surroundings
Value	Designated viewpoint or scenic route marked on OS maps or in tourist information Recognition in relation to heritage assets Protected by local planning policy	Viewpoints or routes, not recognised formally

Magnitude of Visual Change

7.43 Size and scale of visual impacts depends on:

- the scale of the change in view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture; and
- the nature of the view of the proposed development, in terms of the relative amount of time over which it would be experienced and whether views would be full, partial or glimpses.

7.44 All impacts are assumed to be during winter, being the worst case situation with minimal screening by vegetation and deciduous trees. Size/scale is described as being **large**, **medium** or **small**.

7.45 The geographical extent of visual impacts records the extent of the area over which the changes would be visible e.g. whether this is a unique viewpoint from where the Proposed Wind Farm Development can be glimpsed, or whether it represents a large area from which similar views are gained. Geographical extent is described as **widespread** or **localised**.

7.46 Duration is reported as **short term** (0-5 years), **medium term** (5-10 years) or **long term** (over 10 years), as set out in current guidance.[13] Construction and decommissioning impacts are considered to be short term, but operational impacts would all be long term.

7.47 Reversibility is reported as **reversible**, **partially reversible** or **permanent**, and is related to whether the change can be reversed at the end of the phase of development under consideration (i.e. at the end of the construction or at the end of the operational lifespan of the development). Operational impacts are considered to be reversible as the decommissioning phase would remove turbines and most infrastructure at the end of the operational phase. Impacts are therefore considered to be reversible except were specifically stated in the assessment sections below.

Judging the Overall Significance of Landscape and Visual Impacts

7.48 The evaluations of the individual aspects set out above (susceptibility, value, size and scale, geographical extent, duration and reversibility) were considered together to provide an overall profile of each identified impact. An overview was then taken of the distribution of judgements for each aspect to make an informed professional assessment of the overall significance of each impact.

7.49 In this assessment, four levels of impact are used: **major**, **moderate**, **minor** and **negligible**. A higher level of impact was generally attached to higher magnitude changes affecting higher sensitivity resources or receptors.

7.50 Impacts were identified as either **significant** or **not significant** in the context of the EIA Regulations, with major and moderate impacts being judged to be significant. Minor and negligible impacts are judged not to be significant.

7.51 The determination of levels of impact requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case by case basis, as required by published guidance.

7.52 A rigid matrix-type approach, where level of impact is defined simply based on the level of sensitivity combined with the magnitude of change, is therefore not used. As such, the conclusion on level of impact is not always the same.

Direction of Impacts

7.53 The direction of impact (**positive**, **negative** or **neutral**) is determined in relation to the degree to which the proposal fits with the landscape character or view and the contribution to the landscape or the view that the Proposed Wind Farm Development makes, even if it is in contrast to the existing character.

[13] Landscape Institute and the Institute of Environmental Assessment and Management (Third Edition), 2013. *Guidelines for Landscape and Visual Impact Assessment.*

7.54 With regard to wind energy development, there is a broad spectrum of response from the strongly positive to the strongly negative. However, to cover the 'maximum case' situation, potential impacts are assumed to be negative unless otherwise specifically stated in the text.

Baseline Conditions (General)

7.55 This section sets out the baseline characteristics of the landscape across the Site and Study Area. This section is pertinent to both the landscape and visual assessments.

The Site

7.56 The Site lies to the east of the A939 in Nairnshire, Scottish Highlands. The Site is bounded on the west by the A939, and close to the east lies the Moray Council boundary, marked on the ground by a post and wire fence. To the north, the Site extends to the edge of existing forest and to the south lies close to the Moray Council boundary at Lochan Tùtach.

7.57 The Site includes Cairn Duhie, at 312 m Above Ordnance Datum (AOD), a low conical hill with land sloping down from it in all directions. The lowest point of the Site is 200 m AOD, at the northern edge. The southern part of the Site is drained by the Burn of Lochantùtach, which runs east and north to the Dorback Burn that lies to the east. The northern part of the Site is drained by the Stripe of Muckle Lyne and the Stripe of Little Lyne, which both drain northwards into the River Findhorn. Land cover on the Site is of moor and blanket bog, with a few scattered trees. Further information about the land cover is found in Chapter 8: Ecology.

The Study Area

7.58 The Study Area extends to 35 km from the outermost turbines in all directions, and includes land within THC, Moray Council and the CNPA, as shown in Figure 7.1. The Study Area extends from Balintore and Cromarty to Inverness, Aviemore, Tomintoul, Dufftown and Elgin.

Landscape Elements and Landcover

7.59 The Study Area includes the coast and the Moray Firth, as well as extensive and remote areas of Cairngorm moorland, hills and valleys. The landscape of the Study Area therefore includes coastal types from bays and raised beaches to farmland and valleys to high summits and moorland. There are extensive areas of forest in the Study Area, particularly across Nairnshire, Moray and Strathspey.

Geology and Landform

7.60 The geology of the Study Area is one of Devonian Old Red Sandstones along the coast and the lowlands, with Moine or Dalradian metamorphic rocks forming the uplands, with intrusive granites in some areas. The Site is of quaternary tills underlain by granites of the Ardclach Pluton (Ordovician) and Grampain and Dava group metamorphic rocks.

7.61 The main valleys across the Study Area are the Great Glen and the Moray Firth, Strathspey, Strathnairn and Strathdearn and the Findhorn Valley. The highest mountains in the Study Area include:

- Ben Rinnes (840 m AOD), a Corbett, 27.8 km from the nearest turbine of the proposed wind farm development, to the east
- Geal - charn Mòr (824 m AOD), 32.5 km away to the southwest
- Geal Charn (821 m AOD), 31.0 km away to the south-southeast
- Meall a' Bhuachaille (810 m AOD), 30.2 km away to the south
- Creagan a' Chaise (722 m AOD), 21.4 km away to the southeast

Land Use

7.62 The land use of the Study Area responds to topography and elevation, with ley pasture and some arable farmlands on the lowland and coastal areas, pasture farms on the slopes give way to open moorland with rough grazing on the uplands.

7.63 The main roads within the Study Area include the A9 from Inverness to Aviemore, the A96 along the coast, the A95 from Aviemore to Charlestown of Aberlour, the A939 that runs from Nairn past the Site to Grantown-on-Spey to Tomintoul, the A940 from Forres to the A939 south of the Site and the B9007 from Logie north of the Site to Ferness and south to Duthill near Carrbridge. Smaller roads create a network of roads across the lowland areas and straths, but there are few roads near and to the east and west of the Site between the lowlands and Strathspey. Railway lines run from Inverness to Aviemore and southwards and from Inverness along the coast to Elgin towards Aberdeen. Long distance recreational routes across the Study Area include the Dava Way, Speyside Way, other long distance routes, and parts of the National Cycle Network.

7.64 Nucleated settlements in the Study Area tend to be located on the lowlands to the north of the Study Area near the coast or at intersections of valleys, with smaller settlements at road junctions. Isolated or grouped properties are scattered throughout the lower lying areas and up valleys.

7.65 The Study Area provides a wide range of opportunities for recreation, from sea or water based activities to mountaineering, as well as more accessible forms of recreation such as walking on footpaths. Potential impacts of the Proposed Wind Farm Development on recreational interests are discussed in Chapter 15: Socio-Economics, but many landscape and visual receptors are also represented within this LVIA.

Existing Wind Farm Developments

7.66 There are a number of operational wind farms and wind farms under construction in the Study Area, including those listed in Table 7.5: Wind Farms Operational and Under Construction. The locations of these developments are shown on Figure 7.6. All of these wind farms are included in the baseline for the LVIA.

Table 7.5: Wind Farms Operational and Under Construction				
Wind Farm	**Status[14]**	**No. of Turbines**	**Blade Tip Height (m)**	**Distance[15] (km)**
Paul's Hill - Phase 1 and 2	Operational	28	100	12.3
Bognie Farm	Operational	1	61	14.8
Rothes - Phase 1 and 2	Operational and under construction[16]	22 and 18	100 and 125	19.4
Findhorn	Operational	4	44	21.5
Farr	Operational	40	101	25.8
Berry Burn	Under Construction	29	104	8.4

Landscape Related Designations

7.67 Valued landscapes are often recognised by policy designations. The landscape designations found within the Study Area are listed below and shown on Figures 7.4a - b:

- International designations (World Heritage Sites):
  - None
- Nationally designated landscapes (National Parks, National Scenic Areas (NSAs), AONBs):
  - Cairngorms National Park
  - Cairngorm Mountains National Scenic Area (NSA)
- Locally designated landscapes:
  - Drynachan, Lochindorb and Dava Moors SLA
  - Sutors of Cromarty, Rosemarkie & Fort George SLA
  - Loch Ness SLA
  - River Findhorn Area of Great Landscape Value (AGLV)
  - Pluscarden AGLV
  - Culbin Bar AGLV
  - Speyside AGLV
  - Burghead/Findhorn Coast AGLV
- Other designations include:
  - Gardens and Designed Landscapes: Relugas, Gordonstoun (Bog O' Plewlands), Cromarty House, Innes House, House of The Geanies, Tarbat House, The Fairy Glen, Brodie Castle, Pluscarden Abbey (Priory), Darnaway Castle, Rosehaugh, Cawdor Castle, Dalcross Castle, Culloden House, Tomnahurich Cemetery, Leys Castle, Dochfour, Castle Grant, Aultmore, Doune Of Rothiemurchus, Kinrara, Inshriach Nursery, and Grant Park and Cluny Hill (see Chapter 10: Cultural Heritage and Archaeology)
  - Conservation Areas: Grantown on Spey, Robertstown, Elgin, Burghead, Forres, Whitemire, Nairn, Cawdor, Ardsier, Culloden, Inverness, Avoch, Fortrose, Rosemarkie and Cromarty (see Chapter 10: Cultural Heritage and Archaeology)
  - Other archaeological sites as listed in Chapter 10: Cultural Heritage and Archaeology

7.68 In addition to the areas listed above, SNH identified Search Areas of Wild Land (SAWL) in 2002[17] have more recently have produced maps that identify 'core areas' of wild land[18]. Within the Study Area, these areas of wild land exist in the Monadhliath Mountains (approximately 30 km from the Site) and on the Cairngorm Plateau (approximately 27 km from the Site. Given the limited theoretical visibility of the Proposed Wind Farm Development, from these areas and the distance from the Site, it is judged that significant impacts on the core wild land areas are unlikely. Wild land areas are therefore not considered further.

7.69 These designations listed above, and the wild land maps indicate that many parts the Study Area are valued for their landscape, for moorland, valley and coastal landscapes, as well as designed landscapes. The fact that some areas of landscape are not designated does not mean that they do not have value.

The 'Do Nothing' Scenario

7.70 In the absence of the Proposed Wind Farm Development, it is likely that the land would continue under the same land use, and the character of the Site is therefore unlikely to change significantly. However, the surrounding landscape and visual amenity is likely to be influenced by a number of 'forces for change'.

7.71 Forces for change are those factors affecting the evolution of the landscape and which may, consequently, affect the perception of the Study Area in the near or distant future. Although prediction of these is necessarily speculative, those of particular relevance are discussed briefly below.

7.72 Wind farm development is a clear force for change and is likely to continue. There are currently six operational wind farms in the Study Area and consent has been granted for a further five wind farms. There are also a considerable number of proposals for further wind farms. In addition to these wind farms, there are a large number of operational, consented and proposed domestic and Feed in Tariff (FiT) wind turbines of varying heights and rotor diameters, located within agricultural fields, as farmers diversify income and seek opportunities to generate energy for domestic and commercial use. Given the wind resource in this area, there is likely to be ongoing interest in wind farm development in this part of the Scottish Highlands and Morayshire, particularly in the upland areas.

[14] Development status as of the August 2013.

15 Distance between the turbines of the Proposed Wind Farm Development and the turbines of the other wind farm.

16 Rothes 2 became operational in late August 2013. This change in status does not alter the findings of this assessment.

[17] SNH (2002) *Wildness in Scotland's* Countryside, Policy Statement 02/03

[18] SNH (2013) *Core* Areas of Wild Land in Scotland 2013. This document was subject to consultation for the National Planning Framework, and does not therefore represent adopted core wild land areas. Core areas may be subject to change until the finalisation of the National Planning Framework in 2014.

7.73 Agriculture within the Study Area, including land management practices, grazing and arable farming, and commercial forest plantations, are likely to remain important land uses, but may experience pressures from expansion of residential areas on the fringes of settlements.

Landscape Assessment

Landscape Baseline

Landscape Characterisation of the Study Area

7.74 The Study Area includes landscape character types from coastal areas to mountains, with a range of lowland valley types as well as upland fringe and uplands, described in a series of Landscape Character Assessments identified below.

7.75 The landscape character of the north eastern part of the study area is described within the Moray Wind Energy Landscape Capacity Study[19], which updates and supersedes the Moray and Nairn Landscape Assessment[20] (within the Moray Council boundary area only).

7.76 Within the Highland Council boundary area, the landscape character is described within the Moray and Nairn Landscape Assessment, Inner Moray Firth Landscape Character Assessment[21], and Inverness District Landscape Character Assessment[22].

7.77 The landscape character of the Cairngorms region is described within the Cairngorms National Park Character Landscape Assessment[23] (within the National Park boundary), and the Cairngorms Landscape Assessment[24] (outside the National Park boundary).

Landscape Receptors

7.78 The landscape as a whole is a receptor in its own right. However, to distinguish where impacts may be significant, the landscape is divided into parts, the Site, and surrounding landscape character types (LCTs). The Site, described above in paragraph 7.56, lies within the area covered by the Moray and Nairn Landscape Assessment[25], as part of the *Open Uplands* LCT.

7.79 The LCTs within 35 km of the proposed development are illustrated on Figure 7.3a and listed in Table 7.6: Landscape Character Types considered as Landscape Receptors. The theoretical inter-visibility with the Proposed Wind Farm Development is described (see also Figures 7.1 and 7.2). This is used as a means of identifying which LCTs require further assessment and which LCTs can be scoped out because they are unlikely to experience significant impacts arising from the Proposed Wind Farm Development. Closer LCTs to the Site, i.e. those within 15 km of the Proposed Wind Farm Development, are shown superimposed on the ZTV in Figure 7.3b. Key characteristics of LCTs to be assessed are set out in the assessment section below.

Table 7.6: Landscape Character Types considered as Landscape Receptors

LCT[26]	Theoretical visibility of the Proposed Wind Farm Development (ZTV coverage)
Moray and Nairn Landscape Assessment (1998)	
LCA 1 - Soft Coastal Shore (Coastal LCT)	Yes, but no potential for significant effects, as beyond 15 km, not considered further.
LCA 3 - Coastal Forest (Coastal LCT)	Yes, but no potential for significant effects, as beyond 15 km, not considered further.
LCA 4 - Coastal Farmlands (Coastal Lowlands LCT)	Yes, considered in the assessment. Merged with LCT 4 in the Moray Wind Energy Landscape Capacity Study (2012).
LCA 5 - Rolling Farmlands and Forest (Coastal Lowlands LCT)	Yes, considered in the assessment. Merged with LCT 5b in the Moray Wind Energy Landscape Capacity Study (2012).
LCA 6 - Narrow Wooded Valley (River Valleys LCT)	Yes, considered in the assessment. Merged with LCT 6 in the Moray Wind Energy Landscape Capacity Study (2012).
LCA 9 - Upland Moorland and Forestry (Uplands LCT)	Yes, considered in the assessment. Merged with LCT 9 in the Moray Wind Energy Landscape Capacity Study (2012).
LCA 10 - Open Uplands (Uplands LCT)	Yes, considered in the assessment. Merged with LCT 10 in the Moray Wind Energy Landscape Capacity Study (2012).
Inner Moray Firth Landscape Character Assessment (1998)	
1 - Open Firth	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
2 – Enclosed Firth	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
3 – Narrow Firth Corridor	None, not considered further.
4 - Hard Coastal Shore	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
6 - Open Farmed Slopes	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
7 - Forest Edge Farming	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
9 - Intensive Farming	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
10 - Forested Backdrop	Yes, but no potential for significant effects, as beyond 25 km, not considered further.
Inverness District Landscape Character Assessment (1999)	
3.2 - Rolling Uplands	Very limited, beyond 15km, not considered further.
3.3a – Rocky Moorland Plateau with Woodland	None, not considered further.
3.4 - Flat Moorland Plateau with	None, not considered further.

[19] The Moray Council (2012) Moray Wind Energy Landscape Capacity Study
20 SNH (1998) Moray and Nairn Landscape Assessment
21 SNH (1998) Inner Moray Firth Landscape Character Assessment
22 SNH (1999) Inverness District Landscape Character Assessment
23 Cairngorms National Park Authority (2009) Cairngorms National Park Landscape Character Assessment
24 SNH (1996) Cairngorms Landscape Assessment
25 SNH (1998) Moray and Nairn Landscape Assessment
[26] LCA name given in brackets, if applicable

Table 7.6: Landscape Character Types considered as Landscape Receptors	
LCT[26]	**Theoretical visibility of the Proposed Wind Farm Development (ZTV coverage)**
Woodland	
3.5 - Farmed and Wooded Foothills	None, not considered further.
3.6 – Broad Steep-Sided Glen	None, not considered further.
3.8 - Farmed Straths	Very limited, no potential for significant effects, as beyond 15km, not considered further.
3.9 - Rolling Farmland and Woodland	None, not considered further.
Moray Wind Energy Landscape Capacity Study (2012)	
1-3 - Coastal Margin	Yes, but no potential for significant effects, as beyond 15km, not considered further.
4 - Coastal Farmland	Yes, considered in the assessment. Merged with LCA 4 in the Moray and Nairn Landscape Assessment (1998).
5 - Rolling Farmland & Forests	None within 15 km, not considered further.
5a - Rolling Farmland & Forests with Valleys	Limited, no potential for significant effects, as areas with visibility are over 15 km away, not considered further.
5b - Rolling Farmland & Forests with Low Hills	Yes, considered in the assessment. Merged with LCA 5 in the Moray and Nairn Landscape Assessment (1998).
6 - Narrow Wooded Valleys	Yes, considered in the assessment. Merged with LCA 6 in the Moray and Nairn Landscape Assessment (1998).
7 - Broad Farmed Valleys	None, not considered further.
8a - Broad Forested Hills within Upland Farmland	None, not considered further.
8b - Valleys within Upland Farmland	None, not considered further.
9 - Upland Moorland & Forestry	Yes, considered in the assessment. Merged with LCA 9 in the Moray and Nairn Landscape Assessment (1998).
10 - Open Uplands	Yes, considered in the assessment. Merged with LCA 10 in the Moray and Nairn Landscape Assessment (1998).
10a - Open Uplands with Steep Slopes	Very limited, no potential for significant effects, as over 25 km, not considered further.
10b - Open Uplands with Settled Glens	None, not considered further.
Cairngorms Landscape Assessment (1996) (Outside the National Park Boundary)	
Uplands and Glens (LCA 3 - The Monadhliaths)	Very limited, no potential for significant effects, as beyond 15 km, not considered further.
Uplands and Glens (LCA 4 - Strathdearn Hills)	Yes, considered in the assessment. Merged with LCT 82 in the Cairngorms National Park Landscape Character Assessment (2009).
Uplands and Glens (LCA 6 - The North-eastern Hills)	Very limited, no potential for significant effects, as beyond 15 km, not considered further.
Straths (LCA 14 - Lower Spey)	None, not considered further.
Straths (LCA 15 - Strath Avon)	None, not considered further.

Table 7.6: Landscape Character Types considered as Landscape Receptors	
LCT[26]	**Theoretical visibility of the Proposed Wind Farm Development (ZTV coverage)**
Straths (LCA 16 – Glenlivet)	None, not considered further.
Cairngorms National Park Landscape Character Assessment (2009) (Within the National Park Boundary)	
14 - Badenoch: Kincraig to Loch Alvie	None, not considered further.
15 - Badenoch: Loch Alvie to Inverdruie	None, not considered further.
16 - Rothiemurchus Forest	None, not considered further.
17 - Glen More	Very limited, no potential for significant effects, as beyond 25km, not considered further.
18 - Strathspey: Inverdruie to Pityoulish	Very limited, no potential for significant effects, as beyond 25km, not considered further.
19 - Strathspey: Pityoulish to Boat of Garten	Limited, no potential for significant effects, as beyond 20 km, not considered further.
20 - Strathspey: Boat of Garten to Craggan	None, not considered further.
21 - Strathspey: Craggan to Grantown on Spey	None, not considered further.
22 - Abernethy Forest	Limited, no potential for significant effects, as beyond 25 km, not considered further.
23 - Strathspey: Dulnain Strath	None, not considered further.
24 - The Slochd	None, not considered further.
25 - Lower Strathspey: Glen Beag to Dava Moor	Yes, from northern edge, but predominantly forested areas which would provide screening. Not considered further.
26 - Lower Strathspey: Allt na Fhithich	Yes, considered in the assessment. Assessed as part of the Strathdearn Hills LCT.
27 - Lower Strathspey: Castle Grant & Tomvaich	None, not considered further.
28 - Lower Strathspey: Auchnagallin & Blar Mor	Yes, considered in the assessment. Assessed as part of the Strathdearn Hills LCT.
29 - Lower Strathspey: Strathspey	None, not considered further.
30 - Lower Strathspey: Burn of Dalvey Glen	Limited to southeastern edge, no potential for significant effects, as beyond 20 km, not considered further.
31 - Lower Strathspey: Haughs of Cromdale	Limited to southeastern edge, no potential for significant effects, as beyond 20 km, not considered further.
32 - Lower Strathspey: Tomintoul Road	Limited to southeastern edge, no potential for significant effects, as beyond 20 km, not considered further.
33 - Strath Avon: Mid Strath Avon	None, not considered further.
34 - Strath Avon: Lower Strath Avon	Very limited, no potential for significant effects, as beyond 20km, not considered further.
35 - Glen Livet	None, not considered further.

Table 7.6: Landscape Character Types considered as Landscape Receptors	
LCT[26]	**Theoretical visibility of the Proposed Wind Farm Development (ZTV coverage)**
36 - Glen Livet: Braes of Glen Livet	None, not considered further.
37 - Glen Livet: Inchnacape	None, not considered further.
38 - Glen Livet: Delnabo	None, not considered further.
39 - Glen Livet: Conglass Water	None, not considered further.
40 - The Lecht	None, not considered further.
81 - The Monadhliath: North Monadhliath	Limited, no potential for significant effects, as beyond 25 km, not considered further.
82 - The Strathdearn Hills	Yes, considered in the assessment. Merged with LCA 4 in the Cairngorms Landscape Assessment (1996).
83 - Hills of Cromdale	Yes, but no potential for significant effects, as beyond 15km, not considered further.
84 - The North Eastern Hills	Limited, no potential for significant effects, as beyond 30 km, not considered further.
90 - Cairngorms Central Massif	Yes, but no potential for significant effects, as over 20km, not considered further.

7.80 From this analysis, landscape areas that require further analysis and assessment include the Site, and six LCTs. These are considered in the assessment section below.

7.81 LCTs identified in bordering Landscape Character Assessments have been merged where they have a continuous boundary e.g. *LCA 4 - Coastal Farmlands* (part of the Coastal Lowlands LCT) identified in the Moray and Nairn Landscape Assessment (1998) has been merged with *LCT 4 – Coastal Farmland* described within the Moray Wind Energy Landscape Capacity Study (2012).

7.82 The boundary of *LCT 82 - The Strathdearn Hills* identified in the Cairngorms National Park Landscape Character Assessment (2009) is continuous with LCA 4 - Strathdearn Hills in the Cairngorms Landscape Assessment (1996) and these areas have been assessed as one receptor. The parts of LCT 26 and LCT 28 (identified in the Cairngorms National Park Landscape Character Assessment (2009)) with theoretical visibility of the Proposed Wind Farm Development fall within the boundary of the Strathdearn Hills LCT and have therefore not been assessed separately.

Potential Landscape Impacts

7.83 Likely significant landscape impacts have been identified with reference to interactions between the proposed development and landscape receptors.

7.84 Based on the development described in Chapter 4: Description of Development and Chapter 5: Construction and Decommissioning, the sources of impacts that would occur during the construction and decommissioning of the development would include:

- Activities and vehicular/personnel movements, including lighting, on the Site and on local roads;
- The disturbance of areas of land and surface vegetation, including felling of a number of trees;
- The introduction or removal of infrastructure at ground level; and
- The introduction or removal of tall vertical structures (turbines and monitoring masts) with the use of cranes.

7.85 Likely changes relating to construction and decommissioning activities include changes to the physical nature (landcover/vegetation) and the perceived landscape character of the Site as a result of all activities considered together.

7.86 The sources of impacts that would occur during the operational development with a lifespan of 25 years would include the introduction of tall vertical structures with moving parts and infrastructure at ground level that includes tracks, substation and transformers at the base of each turbine (as described in Chapter 4: Description of Development). These would give rise to the following changes:

- Changes in physical nature (landcover/vegetation) and landscape character of the Site as a result of all of the components of the Proposed Wind Farm Development considered together (turbines and all infrastructure); and
- Changes to character of nearby LCTs as a result of all of the components of the Proposed Wind Farm Development considered together (turbines and all infrastructure).

Mitigation

Mitigation by Design

7.87 Landscape and visual considerations, including the appearance of the Proposed Wind Farm Development from key locations, played a key role in the progression of the layout design of the Proposed Wind Farm Development. Additional mitigation measures relate to screening planting around the substation and access track junction with the A939, and colouring of transformers to be cement grey / green[27], as set out in Chapter 4: Description of Development. The design of the Proposed Wind Farm Development is described in Chapter 3: Design Evolution and Alternatives, and the landscape considerations are set out in that chapter. They are therefore not repeated here.

Mitigation During Construction and Decommissioning

7.88 The construction of the turbines and associated infrastructure would follow an agreed Construction and Decommissioning Method Statement[28], which would include arrangements for implementation of various aspects of the works such as vegetation and soil removal, storage and replacement and vegetation restoration, which would help to mitigate potential adverse impacts during the works. These would be designed in agreement with SNH and THC.

[27] Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

28 A Draft Construction and Decommissioning Method Statement is set out in Technical Appendix 5.1, and will be agreed post consent.

7.89 The decommissioning activities would also follow the agreed Construction and Decommissioning Method Statement, and Site restoration would be a key part of the works.

Mitigation During Operation

7.90 Measures to reduce landscape and visual impacts have been embedded into the design of the Proposed Wind Farm Development and the post-construction restoration proposals. Further mitigation is not possible due to the inherent nature of wind farm developments.

Residual Landscape Impacts

Construction and Decommissioning Impacts

Construction Impacts on the Site

7.91 The Site has a land cover of open heather and grass moorland, with scattered trees and areas of blanket bog (for further information see Chapter 8: Ecology). It is part of the gradual transition from high mountains of the Cairngorms to the low coastal landscape.

7.92 **Susceptibility**: Given the current moorland nature and large scale character of the Site, the susceptibility of the Site to development is judged to be medium.

7.93 **Value**: The Site is adjacent to a recognised tourist route[29] (the A939), but is not a designated landscape. The Site is therefore judged to be of medium value.

7.94 **Size and Scale**: There will be large scale changes to the Site, from open undisturbed moorland and bog to an active construction site with vehicular activity, excavations and track construction, and the presence of tall cranes and partially built towers. There will also be areas with felled trees, and others with newly planted trees.

7.95 **Geographical Extent**: Changes to the Site will be localised, taking up small proportion of the total area, with most of the Site area remaining undisturbed. Some areas of the Site would be restored to its former condition after construction.

7.96 **Duration and Reversibility**: The construction works are temporary during the 28 month construction phase (short term). Reversibility would be varied, from fully reversible ground disturbances (albeit that vegetation will take some time to recover) to irreversible infrastructure that forms part of the operational scheme, and some that would not be removed during decommissioning.

7.97 **Impact and Significance**: Construction activities would give rise to moderate, significant impacts to the Site. Although the changes to the Site would bring unfamiliar activities and structures/features onto the moorland Site, they would affect a limited area, and would be temporary.

Decommissioning Impacts on the Site

7.98 The changes would affect the landscape and visual receptors of the Site, where decommissioning impacts would occur and from where activity and changes to ground conditions would be discernible. The predicted landscape and visual impacts on the Site during decommissioning are set out below**.**

7.99 **Susceptibility**: With the operational wind farm on the Site, the susceptibility of the Site to decommissioning activities would be low.

7.100 **Value**: the Site is adjacent to a recognised tourist route (the A939), but is not a designated landscape. It is judged to be of medium value.

7.101 **Size and Scale**: Large scale changes from an active wind farm site to an area of disturbed moorland following a period with vehicular activity, excavations and removal off site of infrastructure elements, including the removal of the turbines with tall cranes.

7.102 **Geographical Extent**: Localised to the Site. The changes would take up a relatively small proportion of the total area of the Site. Much of the Site area would remain undisturbed, and disturbed areas would be restored to moorland after construction.

7.103 **Duration and Reversibility**: Temporary during the 18 month decommissioning phase (short term). Fully reversible, unless it is determined to retain any infrastructure closer to the time of decommissioning.

7.104 **Impact and Significance**: Decommissioning activities would give rise to minor, not significant impacts to the Site.

Operational Landscape Impacts

7.105 This section describes the operational impacts resulting from the Proposed Wind Farm Development on the Site and on areas of the surrounding landscape classified into LCTs. All impacts are long term impacts during the operational period.

The Site

7.106 **Susceptibility and Value**: As describe above, the susceptibility of the Site to development is judged to be medium, and the value of the Site is medium.

7.107 **Size and Scale**: The introduction of the Proposed Wind Farm Development would substantially alter the character of the Site, through the change from open undisturbed moorland to a wind power generating site with turbines and infrastructure including tracks. The access track junction with the A939 would also be visible from within the Site. The margins of the tracks would in time grow over with vegetation, softening their appearance in the landscape. The substation would be visible from parts of the Site, with the screening vegetation around it which would reduce the visibility of the buildings. The scale of change on the Site would be large.

7.108 **Geographical Extent**: Direct impacts will be localised to the Site.

7.109 **Impact and Significance**: The impact of the Proposed Wind Farm Development on the landscape character of the Site would be major, significant.

[29] The A939 is part of the Highland Tourist Route described on the VisitScotland website.

Open Uplands

7.110 This LCT includes the Site and extends east and west, forming part of the upland area between the coastal landscapes to the north and Strathspey to the south. The LCT is described within the Moray and Nairn Landscape Assessment (1998), and to the east of the Site is further described in the updated Moray Wind Energy Landscape Capacity Study (2012). This LCT is labelled as MEN4(10) within THC and 10 within Moray on Figure 7.3b.

7.111 Key characteristics of the landscape taken from the LCA and fieldwork include:

- A series of rounded hills and summits of a generally similar height, broad smooth ridges and expansive gently undulating plateaux;
- The open hills contrast with the densely wooded lower rolling hills and valleys of Moray which form a key feature in views to the north from summit plateaus and minor roads crossing the area;
- Rocky outcrops occasionally break the smoothness of the terrain and small burns flow across the moorland;
- Lochindorb forms a unique feature in the landscape as the only expanse of open water;
- Heather moorland and bog, along with scattered pockets of native pine create a distinctive colourful and textured pattern on the open slopes; and
- Settlement is extremely sparse, limited to occasional scattered farmsteads.

7.112 Open and expansive views are available from around Lochindorb and the edge of the Strathdearn Hills, with the wooded valleys and forests of Moray visible to the north.

7.113 The Paul's Hill (Phase 1 and 2) and Berry Burn Wind Farms are located within this LCT and other wind farms including Rothes Phase 1 and Phase 2 and Findhorn Wind Farms and Bognie Farm turbine are visible from within it.

7.114 **Susceptibility**: The Moray Wind Energy Landscape Capacity Study states that the LCT is of medium sensitivity to wind farm development (large typology) located within it. The susceptibility of this LCT is affected by the presence of existing wind farm developments and overhead transmission lines within the area. However, due to the large scale, simple nature of the landform, the susceptibility is judged to be medium.

7.115 **Value**: Parts of the Open Uplands LCT lie within the Cairngorms National Park and the Drynachan, Lochindorb and Dava Moor SLA, and the LCT is therefore considered to be of high value.

7.116 **Size and Scale**: The Proposed Wind Farm Development would be located within the area of this LCT that is bounded by the A939 to the west and the A940 to the east, and crossed by an overhead transmission line (running east-west) to the north of the Site. The impacts on the landscape of the Site are considered separately above (paragraphs 7.106-7.109).

7.117 Beyond the Site boundary, theoretical visibility of the turbines would be extensive within approximately 3.5 km, with turbines visible from the open moorland areas between the A939 and the A940, and on the slopes of the Knock of Braemoray, Hill of Aitnoch and moorlands around them. From these areas the turbines would form large landscape elements nearby with both vertical emphasis and movement. Existing wind farms are located further afield to the east, such that these would be new elements in the nearby landscape.

7.118 Beyond 3.5 km, the Proposed Wind Farm Development would increase the presence of wind farms within the LCT, albeit as a separate group of turbines further west than Berry Burn and Paul's Hill (Phase 1 and 2) Wind Farms. Theoretical visibility extends over the west facing slopes above the River Divie and up to Carn Kitty and Carn Ghiubhais (to the east of the Site), and over northeast facing slopes to the west of the Leonach Burn up to Tom nan Clach and Carn an t-Sean Liathanaich (to the southwest of the Site). The turbines would also theoretically be visible from the far side of the River Findhorn valley 'Stenness', on the east facing slopes up to Carn nan Tri-tighearnan (west of the Site). From these areas the Proposed Wind Farm Development would be seen as a discrete group of turbines with a sense of separation and distance from the Site. From the areas around Carn Kitty, the Proposed Wind Farm Development would be more distant than Berry Burn Wind Farm. From areas to the southwest and west of the Site, the Proposed Wind Farm Development would be seen to be closer than the other existing wind farms.

7.119 Overall, the scale of change would be large for areas of the LCT within 3.5 km, but small beyond 3.5 km from the Site.

7.120 **Geographical Extent**: Extensive within 3.5 km, localised beyond 3.5 km.

7.121 **Impact and Significance**: Overall, the introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact for the LCT located outside the Site but within 3.5 km of it, and a minor not significant impact for the rest of the LCT.

Coastal Farmland LCT

7.122 The Coastal Farmlands LCT is found along the Moray and Nairnshire coast as a broad continuous band east-west across the northern part of the Study Area. The LCT is described within the Moray and Nairn Landscape Assessment (1998) in the northwest of the study area, and the updated Moray Wind Energy Landscape Capacity Study (2012) in the northeast of the study area. This LCT is labelled as MRN2(4) within THC and 4 within Moray on Figure 7.3b.

7.123 Key characteristics of the landscape taken from the LCT and site visits include:

- flat to gently undulating coastal plain which lies at the foot of the hills to the south;
- a landscape of wide horizons with open arable fields, coniferous plantations and mixed woodland;
- One of the most densely populated areas of the Study Area with a diverse range of land uses (agriculture, housing, key communication routes and military uses); and
- This LCT includes the settlements of Elgin and Forres.

7.124 Open and expansive views across wide coastal horizons are frequent from this LCT, with views southwards, rising to the uplands also a common feature.

7.125 The Findhorn Wind Farm lies within the LCT, beyond 15 km from the Proposed Development Site and other wind farms including Rothes and Berry Burn are visible from it.

7.126 **Susceptibility**: The Moray Wind Energy Landscape Capacity Study[30] states that the LCT is of high-medium sensitivity to wind farm development (large typology[31]) located within it. Given the presence of existing wind farms and other land uses within this LCT and the simple low lying and open nature of the landform, overall, the susceptibility of this LCT to wind farms on the horizon outside the LCT is judged to be medium.

7.127 **Value**: The Burghead/Findhorn Coast AGLV lies adjacent to the Coastal Farmland LCT. A small part of the LCT lies within the Sutors of Cromarty, Rosemarkle and Fort George SLA, however this is focused on the Moray Firth. The LCT is therefore considered to be of medium value.

7.128 **Size and Scale**: The Proposed Wind Farm Development would be visible to the south from areas of this LCT around the settlements of Forres, Nairn and Kinloss and from sections of the main communication routes which run east-west across the low lying coastal strip. Visibility would often be limited by intervening tree cover and built form, however where visible, the turbines would appear as a group located across the uplands, separate from but similar to the existing Berry Burn, and Rothes (Phase 1 and 2) Wind Farms. The scale of change is judged to be small.

7.129 **Geographical Extent**: Localised to long distance views from open farmland and communication routes.

7.130 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this LCT.

Rolling Farmlands & Forest LCT / Rolling Farmland & Forests with Low Hills

7.131 This transitional landscape lies between the coastal plain of the Coastal Lowlands and the expansive open landscape of the uplands to the south of the Coastal Farmland. The LCT is found in two discrete areas to the north of the Site, separated by the *Narrow Wooded Valleys* LCT. The area to the northwest of the Site is described as *Rolling Farmland and Forest* within the Moray and Nairn Landscape Assessment (1998), and lies between the Findhorn Valley and Nairn. The area to the northeast is described as *Rolling Farmland & Forests with Low Hills* in the updated Moray Wind Energy Landscape Capacity Study (2012), and lies south of Forres and to the east of the A940. This LCT is labelled as MRN2(5) within THC and as 5b within Moray on Figure 7.3b.

7.132 Key characteristics of the landscape taken from the LCT and site visits include:

- Complex landform with gently rounded hills and broad narrow incised valleys, often contained and divided by smooth steeped ridges;
- A predominant land use of agriculture with open farmland enclosed by native woodland and hedgerows;
- The presence of woodland across the LCT forms a balance alongside the agricultural landscape; and
- Estate policies are a characteristic feature of the landscape, with stone walls, beech and holly hedges, parkland and wooded policies being particularly evident.

7.133 Views out from this LCT are often partially enclosed by tree cover within the LCT area.

7.134 There are no existing wind farms located within this LCT; however other wind farms including Findhorn, Rothes, Paul's Hill (Phase 1 and 2) and Berry Burn Wind Farms are visible from it.

7.135 **Susceptibility**: The Moray Wind Energy Landscape Capacity Study states that the LCT is of high sensitivity to wind farm development (large typology) located within it. Due to the scale of this transitional LCT, between coastal farmlands and upland moorland, and the presence of small landscape features, this LCT is considered to be of high susceptibility to wind farm development within it. Given the presence of existing wind farms in the wider landscape around this area, overall the susceptibility to wind farm development outside the LCT is considered to be medium.

7.136 **Value**: There are no designated landscapes within this LCT, however the River Findhorn AGLV is located within the *Narrow Wooded Valleys* LCT which separates this LCT. The LCT is therefore considered to be of medium value.

7.137 **Size and Scale**: The Proposed Wind Farm Development would be visible from parts of this transitional LCT which separates the low lying coastal plain from the open uplands and moorland. The presence of forest throughout this LCT would limit visibility to areas where open views towards the neighbouring upland areas to the south are possible. Visibility of the Development would be in the context of the existing wind farms of Rothes (Phase 1 and 2), Paul's Hill (Phase 1 and 2) and Berry Burn Wind Farms, which appear in views south from within this LCT. The scale of change is judged to be small.

7.138 **Geographical Extent**: Localised to areas north and northwest of the Site where gaps in the pattern of coniferous forest allow views towards the uplands.

7.139 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this LCT.

Narrow Wooded Valley(s)

7.140 The LCT encompasses the Findhorn Valley to the northwest of the Site. The LCT is found in two adjoining areas. The area to the west is described within the Moray and Nairn Landscape Assessment (1998), and the area to the north in the updated Moray Wind Energy Landscape Capacity Study (2012). This LCT is labelled as MRN3(6) within THC and as 6 within Moray on Figure 7.3b.

7.141 Key characteristics of the landscape taken from the LCA and fieldwork include:

- Rocky gorges, falls, pools and channels of the River Findhorn which form a distinctive focus within this narrow enclosed valley;

[30] Moray Council (2012) Moray Wind Energy Landscape Capacity Study.

31 The large typology is defined as single turbines or groups of turbines of 80-130 m to blade tip height within the Moray Wind Energy Landscape Capacity Study (2012).

- Densely wooded with semi-natural pine, birch and mixed broadleaves intermingled with mature policy woodlands;
- Small, steeply rolling lush green pastures interrupt woodland cover and are often edged by scrub woodland, rough grassland and enclosed by stone dykes;
- The variety of vegetation within the valley creates a colourful and textured diverse landscape; and
- Estate policies exert strong influences on the pattern and nature of land use, with stone vernacular buildings often hidden in woodland.

7.142 Views from this LCT are often enclosed by landform and woodland.

7.143 There are no existing wind farms located within this LCT, but wind farms including Rothes, Paul's Hill (Phase 1 and 2) and Berry Burn Wind Farms are visible from it, where views to the uplands are possible. The overhead transmission line which crosses the LCT and the Site (east-west) is a prominent vertical feature in views from parts of the LCT.

7.144 **Susceptibility**: The Moray Wind Energy Landscape Capacity Study states that the LCT is of high sensitivity to wind farm development (large typology) located within it. This is a small scale LCT with an enclosed character, due to the extensive woodland cover and steep river valley landform. Given the enclosed nature of the valley, it is judged that it is of high susceptibility to wind farm development that would appear on the enclosing slopes of the valley, but medium susceptibility to wind farm development in the surrounding landscape. As the Proposed Wind Farm Development would not be located on the enclosing slopes to the valley, the susceptibility of the LCT is taken as medium for this assessment.

7.145 **Value**: The LCT contains the River Findhorn AGLV and is therefore considered to be of high value.

7.146 **Size and Scale**: The Proposed Wind Farm Development would theoretically be visible from much of this LCT, however due to the presence of the deciduous woodland and coniferous forest plantations within adjacent LCTs, visibility of turbines would be limited to open areas of the LCT where existing views towards the uplands to the south are possible. The Proposed Wind Farm Development would not be visible from the narrow wooded River Findhorn corridor and would therefore not affect the key characteristics of the LCT, appearing detached from the LCT in the more open upland landscape to the south or southeast of the LCT. The scale of change is judged to be small.

7.147 **Geographical Extent**: Localised to the elevated rounded hills in the western part of the LCT, and from areas where open views towards the open uplands exist.

7.148 **Impact and Significance**: Although some areas of the LCT would have views of turbines relatively close to the LCT, overall, the introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this LCT.

Upland Moorland and Forestry

7.149 Two areas of this LCT are located to the east and the west of the Findhorn Valley, forming part of an upland zone between the coastal lowlands to the north and Strathspey to the south. The area to the west of the Site is described within the Moray and Nairn Landscape Assessment (1998), and is found between Newlands of Fleenas Wood and Assich Forest south of Cawdor. The area to the northeast of the site is described in the updated Moray Wind Energy Landscape Capacity Study (2012), and is found to the east of the A940 extending to Mill Buie. This LCT is labelled as MRN4(9) within THC and 9 within Moray on Figure 7.3b.

7.150 Key characteristics of the landscape taken from the LCA and fieldwork include:

- Largely inaccessible areas of broad, rounded hills and upland plateaux bordering the Open Uplands LCT to the south;
- Vegetation cover is largely an equal balance of coniferous forest plantations and heather and grass moorland, forming simple large-scale patterns in the landscape;
- Largely unpopulated with scattered farmsteads and some semi-improved pasture; and
- Coniferous plantations are geometric in pattern, however natural regeneration of native pine and birch in some areas have created more open and diverse transitional zones.

7.151 Views north over the Moray from this LCT are often expansive in gaps between the dense forest cover, views south can extend to the Cairngorms.

7.152 The Rothes (Phase 1 and Phase 2) Wind Farm is located within this LCT and other wind farms including Paul's Hill (Phase 1 and 2), Findhorn and Berry Burn Wind Farms are visible from within it.

7.153 **Susceptibility**: The Moray Wind Energy Landscape Capacity Study states that the LCT is of medium sensitivity to wind farm development (large typology) located within it. Due to the extensive coniferous forest and wind farm development within the LCT and the large scale and upland nature of this LCT, the susceptibility to wind farm development outside the LCT is judged to be low.

7.154 **Value**: Part of the forested area is designated as the Pluscarden AGLV and the LCT is therefore considered to be of high value.

7.155 **Size and Scale**: Visibility of the Proposed Wind Farm Development would be limited to areas of this LCT with open views not contained by forest. The ZTV (Figure 7.3b) indicates that the Development would be seen from many areas within 15 km of the Site, where the topography faces towards the Site. However, forest cover would greatly reduce the actual visibility of the turbines, while the trees are standing. The addition of the Proposed Wind Farm Development in the presence of the turbines of Berry Burn, Rothes (Phase 1 and 2) and Paul's Hill (Phase 1 and 2) Wind Farms, would reflect the current pattern of wind farm development located to the south of this LCT.

7.156 From the western area of the LCT (to the west of the River Findhorn valley) the Proposed Wind Farm would be seen as an additional wind farm development in the wider landscape to the east, albeit closer to the LCT than the existing wind farms. The intervening River Findhorn valley would provide a sense of separation between the Proposed Wind Farm Development and the LCT. From the eastern area of the LCT (to the east of the River Findhorn valley), the Proposed Wind Farm Development would be seen from west and south

facing open slopes that are to the west of Mill Buie. The Proposed Wind Farm Development would form an additional group of turbines visible in the wider landscape to the southwest of the LCT, seen in the context of existing wind farms both within and outside this area. Overall, the scale of change is judged to be small.

7.157 **Geographical Extent**: Very localised, due to the presence of coniferous forest.

7.158 **Impact and Significance**: Overall, the introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this LCT.

Upland Areas – The Strathdearn Hills (Cairngorms LCA, 1996)

7.159 The Strathdearn Hills lie to the south of the Site, along the northern edge of the National Park, both within the National Park and outside it, north to the Moray Council boundary. The landscape characteristics are described within the Cairngorms Landscape Assessment (1996) for areas outside of the National Park, and the updated Cairngorms National Park Landscape Character Assessment (2009) for areas within the National Park. These areas are labelled as CNG2 within THC and 82 within the National Park on Figure 7.3b.

7.160 Key characteristics of the landscape taken from the LCA and fieldwork include:

- Hills with long shallow slopes, broad smoothed ridges and rounded peaks;
- The smoothness of the terrain and sinuous shape of the hills, is broken in places by rocky outcrops;
- A pattern of broad glens cut into the hills on a north south alignment creating opportunities for views into the LCT from Strathspey;
- Upper slopes and hill tops are often covered by heather with small pockets of native pine and muir burning;
- Some coniferous plantations occur on lower slopes, however these are not extensive; and
- The LCT has a sparse distribution of farmsteads and a feeling of 'wildness' with expansive views over Moray and the Cairngorm Foothills.
- The LCT has a lack of tree cover allowing open expansive views over Moray and the Cairngorm foothills.

7.161 There are currently no existing wind farms located within this LCT, although Paul's Hill (Phase 1 and 2) and Berry Burn Wind Farms are located nearby, and Rothes Phase 1 and Phase 2 are visible further afield.

7.162 **Susceptibility**: Given the open nature of the hills and the designation of much of this area as an SLA, the susceptibility of this LCT is judged to be high.

7.163 **Value**: The Strathdearn Hills LCT includes parts of the Drynachan, Lochindorb and Dava Moors SLA, and parts of the northern fringe of the Cairngorms National Park. The LCT is therefore considered to be of high value.

7.164 **Size and Scale**: The Proposed Wind Farm Development would theoretically be visible from areas of this LCT to the south and southeast of the Site, including areas above Lochindorb and the corridor of the Old Military Road and A939 to the south, and the west facing upland slopes and summits of Larig Hill and Carn na Lòine to the southeast. Visibility within the National Park will be very limited, as shown on Figures 7.3b and 7.4b. The turbines would be located approximately 5 km from the northern edge of this LCT at Dava. They would be seen in panoramic views across Dava Moor from the B9007 and A940 crossing the elevated upland plateaux. The Proposed Wind Farm Development would be seen as a separate group of turbines from Berry Burn and Paul's Hill (Phase 1 and 2) Wind Farms, which are located at similar distances from the LCT. There would be a perception of separation between the LCT and the Site, due to the intervening form of Hill of Aitnoch and the moorland and woodland around Dava. The scale of change, in the presence of the existing wind farms, is judged to be small.

7.165 **Geographical Extent**: Widespread across parts of this LCT.

7.166 **Impact and Significance:** Overall, the introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on the LCT.

Visual Assessment

7.167 The methodology for the visual assessment has been set out in the methodology section above. This section includes the visual baseline and assessment sections.

Visual Baseline

Analysis of Visibility Patterns around the Study Area

7.168 The Study Area is described in the baseline section earlier in the chapter. On a regional scale, the study area slopes down from the Cairngorms in the south, down across lowlands to the coast and open Moray Firth to the North, with land beyond the Moray Firth to the northwest. From the high peaks of hills views are extensive, as are views looking out from the coast. On a local scale, views depend on local topographic conditions, and can be very constrained by narrow valleys or extensive forest plantations, or views can be extensive across the surrounding landscape. The ZTV in Figure 7.1 shows where the Proposed Wind Farm Development would be visible, and also serves to illustrate the patterns of intervisibility across the Study Area.

7.169 The ZTV in Figure 7.1 indicates that the Knock of Braemoray and Hill of Aitnoch would contain views of the Proposed Wind Farm Development to the southeast and south, and the subtle ridges of the Darnaway Forest and the Ord ridge, would contain views to the north and northwest. To the east, visibility is contained by Carn Kitty, Mill Buie and Newtyle Forest, and to the west, visibility is contained by Carn a' Chrasgie, Carn nan Tri-tighearnan, Cairn Kincraig, Carn an t-Sean-liathanaich and Carn Gruamach. Beyond these features to the east, south and west, visibility is limited to high ground. To the north and northwest, beyond the relatively low ridges of Darnaway Forest and the Ord, longer distance views across low lying land are theoretically possible. However, it is across lower lying land that local screening by forest, woodlands and buildings becomes more of a factor, such that many locations shown to

have theoretical visibility on the ZTV would not actually have views of the Proposed Wind Farm Development. More detailed analysis of likely visibility is provided in the assessment section below.

7.170 Figure 7.8 shows the ZTV of the Proposed Wind Farm Development compared with the ZTV of Berry Burn Wind Farm, which is the closest wind farm to the Site (it is currently under construction). This figure shows that the Knock of Braemoray and Carn Biorach form a ridge between the wind farms that restricts intervisibility in the local area. The Berry Burn Wind Farm site is at higher elevation that that of the Proposed Wind Farm Development, such that the Berry Burn Wind Farm can be seen over most of the western part of the Proposed Wind Farm Development's ZTV, but the opposite is not true for the eastern part of the Berry Burn Wind Farm ZTV (east of Carn Kitty).

7.171 The intervisibility of the Proposed Wind Farm Development with Pauls Hill and Rothes Wind Farms would have a similar pattern to that with Berry Burn Wind Farm, as they are located further to the east. Intervisibility with Bognie Farm and Findhorn Wind Farms would theoretically be widespread across the lowland areas around Forres, but would actually be restricted to higher ground and areas with open views. Intervisibility with Farr Wind Farm would be limited to the high plateau areas around Carn nan Tri-tighearnan and Carn an t-Sean-liathanaich, given this high ground between Farr Wind Farm and the Proposed Wind Farm Development.

Visual Receptors

7.172 Visual receptors are people. The assessment of visual impacts considers the changes that people would see in views from various locations. Viewers can be local residents, tourists, walkers and recreational route users, road users, train travellers etc.

Settlements

7.173 Settlement within the Study Area is focussed on low lying areas, particularly along the coastal lowlands, along the A96 that forms an important transport corridor. Settlements are typically at river crossing points, and at historic route junctions. The largest settlements in the Study Area are Inverness, Nairn, Forres and Elgin. Coastal settlements include Cromarty, Fortrose, Findhorn and Burghead. Inland, settlements are located in valleys, Strathspey being the largest scale valley across the study area, with Aviemore, Grantown on Spey, Charlestown of Aberlour and Rothes the main settlements along it. Closer to the Site, the Findhorn valley is narrow and steep sided, but has a number of small settlements within or near it, associated with crossing points. These include Ferness, Relugas and Logie. Settlement elsewhere near the Site is made up of isolated farms or cottages, and small clusters of buildings. Clusters of dwellings within 5 km of the Site include Beachans, Dava and Redburn.

7.174 Based on an analysis of theoretical visibility, using the ZTV and set out in Table 7.7: Analysis of Visiblity from Settlements, a number of these settlements can be scoped out of the assessment because there is no theoretical visibility, or very limited theoretical visibility at some distance from the Site, such that there is no likelihood of significant visual impacts occurring. Isolated residences are not assessed individually, but impacts on routes that pass near them can be taken from the assessment of sequential views from routes below.

Table 7.7: Analysis of Visiblity from Settlements

Settlement	Analysis of Theoretical and Actual visibility of the Proposed Wind Farm Development
Inverness	No theoretical visibility, not considered further.
Nairn	Theoretical visibility across much of the settlement (15 km away). There would be views from the southeastern edge of Nairn and from some properties with views to the southeast. However, much of the settlement would have no views due to local screening by buildings of the settlement. Visibility is also reduced by forest plantations on the Laiken Forest and other ridges between the settlement and the Site. There are unlikely to be widespread visual impacts on this settlement, and it is therefore not considered further. A wireframe from the southeastern edge of Nairn, at the Sainsbury's supermarket is included in Technical Appendix 7.4 (Wireframe 3).
Forres	Theoretical visibility across much of the settlement (15 km away). There are limited locations within Forres with views to the southwest. These include areas on the elevated flanks of Cluny Hill such as at Nelson Tower, limited parts of the cemetery and Cluny Hill College, as well as from Forres Golf Course. Elsewhere views are screened by local buildings and trees. There are unlikely to be widespread visual impacts on this settlement, and it is therefore not considered further.
Elgin	No theoretical visibility, not considered further.
Cromarty	No theoretical visibility, not considered further.
Fortrose	Theoretical visibility across the settlement, but at 27 km away there is no likelihood of significant impacts, not considered further.
Findhorn	Theoretical visibility across the settlement, but at 21 km away there is no likelihood of significant impacts, not considered further.
Burghead	Theoretical visibility across the settlement, but at 28 km away there is no likelihood of significant impacts, not considered further.
Aviemore	No theoretical visibility, not considered further.
Grantown-on-Spey	No theoretical visibility, not considered further.
Charlestown of Aberlour	No theoretical visibility, not considered further.
Rothes	No theoretical visibility, not considered further.
Ferness	Theoretical visibility across part of the settlement (within 5 km). There are currently no views of the Site from the line of cottages that make up Ferness, due to forest between the settlement and the Site. There would not be visibility of turbines with existing forest, but this settlement is included in the assessment on the basis that there may be visibility of the turbines in the future, should intervening forest be felled. A viewpoint at Ferness is used in the assessment, Viewpoint 2.
Relugas	Relugas is a scattered settlement with houses set on the slopes of the Findhorn valley. There is no theoretical visibility from the settlement and it is therefore not considered further.
Logie	Logie is a scattered settlement with houses within the Findhorn valley and along the A940. There is theoretical visibility across parts of the settlement along the road

Table 7.7: Analysis of Visiblity from Settlements	
Settlement	**Analysis of Theoretical and Actual visibility of the Proposed Wind Farm Development**
	(8 km away). Although there is theoretical visibility from parts of this settlement that lie above the Findhorn Valley, actual views towards the south and southwest are screened by the tops of the trees of the woods along the Findhorn valley. Distant hills are therefore not visible in the direction of the Site. The Proposed Wind Farm Development is also unlikely to be visible and give rise to widespread visual impacts on this settlement, and it is therefore not considered further.
Edinkillie	Edinkillie is a scattered settlement that includes houses by the A940 at Glenernie, Edinkillie and Aucheorn, and houses around Beachans along the minor road up the River Divie valley. There is theoretical visibility across parts of the settlement (5 km away). The River Divie valley is wooded in this area, but there are still views over the valley towards the southwest. This settlement in included in the assessment. A viewpoint at Aucheorn is used in the assessment, Viewpoint 9.
Dava	Dava is a small scattered settlement near the junction of the A939 and the A940. There is theoretical visibility from the settlement (within 5 km). There is woodland around Dava, but this would not screen views from the houses, such that there would be visibility of the Proposed Wind Farm Development from Dava. It is therefore included in the assessment. A viewpoint at Dava Junction is used in the assessment, Viewpoint 7.
Redburn	Redburn is a scattered settlement on the northwest side of the Findhorn valley. Individual houses are set within woodland. There is theoretical visibility across much of the settlement (within 5 km). The woodland within which the houses are set screens most views from most properties. Those with more open views may have visibility of the turbines of the Proposed Wind Farm Development, but these are likely to be screened in part by woodland nearby. While there may be some views, it is considered unlikely that there would be widespread visual impacts on this settlement, and it is therefore not considered further.

7.175 From this analysis, settlements that require further analysis and assessment include Ferness, Edinkillie and Dava. These are considered in the assessment section below.

Routes

7.176 Routes across the Study Area form a hierarchical network of road, rail and walking routes. Road and Rail routes use low lying areas or valleys and passes, but walking routes are more variable and can pass over hills and along ridges. The main roads across the Study Area include the A9, the A96, the A95, the A939, the A940, the A941, the A82 southwest from Inverness, and the A832 along the Black Isle. Smaller B roads that pass within 15 km of the Site include the B9007 from Logie to Duthill near Carrbridge, the B9101, B9090 and B9091 southwest of Nairn, the B9010 from Forres to Elgin via Glen Lossie, and the B9102 from Criagellachie to Grantown on Spey. Smaller C roads and tracks create a network of roads across the lowland areas and straths. Those that pass within 10 km of the Site include the Lochindorb road, the Aitnoch to Dulsie road, roads that run along the Findhorn Valley and the road over the Darnaway Forest from Coulmony to Lethan. General Wade laid out a military route that passed along what is now the B9007 from Duthill to Dunearn, and the minor road from Dunearn to Cawdor.

7.177 Two railway lines run across the Study Area, from Inverness to Aviemore, and from Inverness along the coast to Elgin towards Aberdeen.

7.178 Long distance recreational routes across the Study Area include the Dava Way, the Great Glen Way, the Great Glen Canoe Trail, the Moray Coast Trail and the Speyside Way. Sections of National Cycle Network routes also cross the study area. NCN1 runs from Elgin to Nairn, Inverness and along the Black Isle to Cromarty, Nigg and northwards along the coast. NCN7 broadly follows the corridor of the A9 using small roads. These routes are shown on Figure 7.5.

7.179 Core paths in the vicinity of the Site are considered in Chapter 15: Socio-Economics, and are shown on Figure 15.1: Designated Recreational Routes.

7.180 Based on an analysis of theoretical visibility, using the ZTV and set out in Table 7.8: Analysis of Visibility from Routes, several of the routes can be scoped out of the assessment because there is no theoretical visibility, or very limited theoretical visibility at some distance from the Site, such that there is no likelihood of significant visual impacts occurring.

Table 7.8: Analysis of Visibility from Routes	
Route	**Analysis of Theoretical and Actual visibility of the Proposed Wind Farm Development**
A9 from Inverness to Aviemore	No theoretical visibility, not considered further.
A96 along the coast	Theoretical visibility some sections of the route, including around Forres, Nairn and Brackley. (13 km away at the closest point, Auldearn). Given the settled nature of the roadsides through the settlements there would be no actual visibility from within the settlements. There would be views from open sections of the route. This route is included in the assessment.
A95 from Aviemore to Charlestown of Aberlour	No theoretical visibility, not considered further.
A939 from Nairn to Tomintoul	There would be theoretical visibility between Laiken Forest and Glaschoil. (adjacent to the Site at its closest point). Although some sections of this route are contained within woodland, or have woodland screening views, there would be long sections of this route with views of the Proposed Wind Farm Development. This route is included in the assessment.
A940 from Forres to Dava	There would be theoretical visibility between Dava and Logie, and limited visibility of Forres. (approximately 1.5 km from the Site at its closest point, Knock of Braemoray). Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development. This route is included in the assessment.
A941 from Dufftown to Lossiemouth	No theoretical visibility, not considered further.

Table 7.8: Analysis of Visibility from Routes	
Route	**Analysis of Theoretical and Actual visibility of the Proposed Wind Farm Development**
A82 southwest from Inverness	No theoretical visibility, not considered further.
A832 along the Black Isle	There would be theoretical visibility along some sections of the route, but at 27 km away at the closest point (Fortrose) there is no likelihood of significant impacts, not considered further.
B9007 from Logie to Carrbridge	There would be theoretical visibility between Relugas and Burnside. (approximately 1.6 km from the Site at its closest point, Ferness). Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development. This route is included in the assessment.
B9101, B9090 and B9091 southwest of Nairn	There is no theoretical visibility for the B9101, but some theoretical visibility from the B9091 and B9090 north of Cawdor. However, at 17 km away there is considered to be little likelihood of significant impacts, and these route are not considered further.
B9010 from Forres to Elgin via Glen Lossie	There is very limited theoretical visibility within and close to Forres. However, at 16 km away there is considered to be little likelihood of significant impacts on the experience of the route, and the route is not considered further.
B9102 from Criagellachie to Grantown on Spey	No theoretical visibility, not considered further.
Lochindorb road	Theoretical visibility from this route across open moorland would extend from Dava to Lochindorb. The route is approximately 4 km from the Site at its closest point, Dava. This route is included in the assessment.
Aitnoch to Dulsie road	Theoretical visibility from this route across open moorland would extend from Aitnoch to Dunearn. The route is approximately 1 km from the Site at its closest point, at the junction with the A939. This route is included in the assessment.
Roads that run along the Findhorn Valley	There are sections of these routes that would have theoretical visibility, between Conicaval and Banchor. The route is approximately 3.5 km from the Site at its closest point, Levrattich. This route is included in the assessment.
Road over the Darnaway Forest from Coulmony to Lethan	There is theoretical visibility between Coulmony and Lethan Bar. The route is approximately 4 km from the Site at its closest point, Coulmony. This route is included in the assessment.
General Wade's road from Dunearn to Cawdor	There is theoretical visibility between Dunearn and Urchany. The route is approximately 4 km from the Site at its closest point, Dunearn. This route is included in the assessment.
Railway from Inverness to Aviemore	No theoretical visibility, not considered further.
Railway from Inverness to Elgin	There would be theoretical visibility from around Forres and Nairn. (13.5 km away at the closest point, Brodie). Given the frequent woodlands along the railway, and the settlements along the route, there would be very limited actual visibility from this railway. This route is included in the assessment.
Dava Way	Theoretical visibility from this route would extend from Glaschoil to Altyre Woods. The route is approximately 3 km from the Site at its closest point, Dava Junction. Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development. This route is included in the assessment.
Great Glen Way	No theoretical visibility, not considered further.
Great Glen Canoe Trail	No theoretical visibility, not considered further.
Moray Coast Trail	There is theoretical visibility from the route between Kinloss and Burghead, but at 20 km away at the closest point (Kinloss) there is no likelihood of significant impacts, not considered further.
Speyside Way	No theoretical visibility, not considered further.
National Cycle Network Route 1	There would be theoretical visibility from this route around Kinloss, Forres, Nairn, Urchany and sections on the Black Isle. (11 km away at the closest point, Urchany). Given the frequent woodlands along the railway, and the settlements along the route, there would be very limited actual visibility from this railway. This route is included in the assessment.
National Cycle Network Route 7	No theoretical visibility, not considered further.

7.181 From this analysis, routes that require further analysis and assessment include the A96 and the Railway from Inverness to Elgin, the A939, A940, B9007, the Lochindorb road, the Aitnoch to Dulsie road, the Roads that run along the Findhorn Valley, the road over the Darnaway Forest from Coulmony to Lethan, General Wade's road from Dunearn to Cawdor, the Dava Way and NCN1. These are considered in the assessment section below.

Viewpoints

7.182 In addition to the settlement and routes across the Study Area, viewpoints were selected to represent and assess the visual impacts of the proposal that would be seen by various groups of people (visual receptors). The viewpoint list is a representative selection of locations agreed with the statutory consultees. It is not an exhaustive list of locations from which the Proposed Wind Farm Development would be visible. Seventeen viewpoints were selected through desk study, site work and discussions with THC, Moray Council, SNH and CNPA, and taking into account feedback from the local community during the scoping process. These viewpoints are all publicly accessible and include:

- Representative viewpoints selected to represent the experience of different types of receptor;
- Specific viewpoints selected because they are key and sometimes promoted viewpoints within the landscape; and
- Illustrative viewpoints chosen specifically to demonstrate a particular impact of specific issue.

7.183 The viewpoints were selected to represent a range of receptors, viewing directions, distances and elevations. The viewpoints are listed in Table 7.9: Viewpoints, and shown on Figure 7.5.

The baseline descriptions for these viewpoints are located with the assessment for each, to avoid repetition of information.

Table 7.9: Viewpoints

Viewpoint		Grid Reference		Distance (km)[32]
1	Little Aitnoch	297077	840869	1.0
2	Ferness	296246	844806	1.6
3a	A940, above Kerrow	300046	841888	1.7
3b	Knock of Braemoray	301108	841811	2.8
4	A939, West of Aitnoch	297996	839712	2.0
5	B9007, near Mount	298018	846318	2.4
6	Ardclach Bell Tower	295382	845323	2.6
7	Dava Junction	300868	839260	3.6
8	B9007, Old Military Road	294192	838869	4.4
9	A940, Aucheorn	302049	847220	5.3
10	A939 and Dava Way	301425	834551	7.9
11	Carn nan Gabhar above Lochindorb	298024	833774	7.9
12	Carn Kitty	309000	842750	10.6
13	Carn Allt Laoigh	292240	831258	11.8
14	Mill Buie	309028	850091	12.7
15	Carn an Uillt Bhric	283800	839100	13.8
16	Califer	308400	857072	16.8
17	Creagan a' Chaise	310400	824200	21.4

7.184 In addition to these viewpoints, ten wireframes are provided in Technical Appendix 7.4. These locations were requested through consultation, but are not described in text. It is considered that the viewpoint selection above provides an adequate representation of the range of impacts that the Proposed Wind Farm Development would potentially have. The wireframe locations include:

- Wireframe 1: A939, Ardclach War Memorial
- Wireframe 2: General Wade's Road
- Wireframe 3: Nairn, Sainsbury's
- Wireframe 4: Findhorn
- Wireframe 5: Chanonry Point, Black Isle
- Wireframe 6: Ben Rinnes
- Wireframe 7: Sutors of Cromarty
- Wireframe 8: Meal a' Bhuachaille
- Wireframe 9: Geal Charn
- Wireframe 10: Ptarmigan Restaurant, Cairngorm.

Potential Visual Impacts

7.185 Potential visual impacts that would occur as a result of the introduction of the Proposed Wind Farm Development include the introduction of tall vertical structures with moving parts into views towards the Site, and views of infrastructure at ground level including tracks, substation and transformers at the base of each turbine (as described in Chapter 4: Description of Development) where the Site itself is visible. Visibility of the Proposed Wind Farm Development would progressively increase during the construction phase (as turbines are erected), be at its maximum during operation and would reduce during the decommissioning phase (as turbines are removed).

Mitigation

Mitigation by Design

7.186 Landscape and visual considerations, including the appearance of the Proposed Wind Farm Development from key locations, played a key role in the progression of the layout design of the Proposed Wind Farm Development. Additional mitigation measures relate to screening planting around the substation and access track junction with the A939, and colouring of transformers to be cement grey / green[33], as set out in Chapter 4: Description of Development. The design of the Proposed Wind Farm Development is described in Chapter 3: Design Evolution and Alternatives, and the visual considerations are set out in that chapter. They are therefore not repeated here.

Mitigation During Construction and Decommissioning

7.187 The construction of the turbines and associated infrastructure would follow an agreed Construction and Decommissioning Method Statement[34], which would include arrangements for implementation of various aspects of the works such as vegetation and soil removal, storage and replacement and vegetation restoration, which would help to mitigate potential adverse impacts during the works. These would be designed in agreement with SNH and THC.

7.188 The decommissioning activities would also follow the agreed Construction and Decommissioning Method Statement, and Site restoration would be a key part of the works.

Mitigation During Operation

7.189 Measures to reduce landscape and visual impacts have been embedded into the design of the Proposed Wind Farm Development and the post-construction restoration proposals. Adopted Forestry Commission Scotland forest management plans[35] for plantations to the north and

[32] Distance between the viewpoint and the nearest turbine of the Proposed Wind Farm Development.

[33] Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

34 A Draft Construction and Decommissioning Method Statement is set out in Technical Appendix 5.1, and will be agreed post consent.

[35] Forestry Commission Scotland (2005) Assich, Laiken and Ferness FDP Mid Term Review

northeast of the Site would not create clear-fell areas between Ferness and the Site, but would maintain forest cover. Proposed landscape works and tree planting will help to screen the substation. In addition, felling of trees necessary to comply with turbine manufacturer warranties will be selective, with trees being felled only before they exceed maximum allowable heights. Further mitigation across the wider landscape is not possible due to the inherent nature of wind farm developments.

Residual Visual Impacts

7.190 This section describes the impacts resulting from the introduction of the Proposed Wind Farm Development (including turbines and infrastructure) into views seen from the surrounding area, considered through the assessment of visual impacts on settlements, routes and viewpoints. All impacts are long term, and are considered to be largely reversible as turbines and visible above ground infrastructure would be removed during the decommissioning phase. Some visible tracks may be left in place, but this would be subject to agreement.

Impacts on Settlements

7.191 An analysis of the theoretical and likely actual visibility of the Proposed Wind Farm Development from settlements across the study area, particularly those closer to the Site, is set out in Table 7.7: Analysis of Visiblity from Settlements. The settlements that require assessment of impacts include Ferness, Edinkillie and Dava. These are considered below.

Ferness

7.192 In the direction of the Site, views from the line of cottages comprising Ferness are across the B9007 up a rough grazing field to the A939 that runs along the edge of a large forest plantation owned by Forestry Commission Scotland (FCS) (see Viewpoint 2 and Figure 7.13). To the south, a line of coniferous trees along a field boundary filters the view. These trees are owned by the Glenferness Estate and are scheduled for long term retention (i.e. beyond the operational lifetime of the Proposed Wind Farm Development). The Applicant is currently discussing opportunities with the Estate to extend this line of trees to further enhance screening. Adopted FCS forest management plans[36] for plantations to the north and northeast of the Site indicate that the forest area between Ferness and the Site, known as New Inn Wood, is classed as Group Selection, which means that small coupes of trees would be felled at a time and replanted, in order to maintain woodland cover. Therefore, views towards the Site are very unlikely to be opened up by felling.

7.193 **Susceptibility**: Residents are assumed to have high susceptibility to changes in views from their properties.

7.194 **Value**: Residents are assumed to value the views from Ferness. Ferness is a proposed Conservation Area, and is adjacent to a recognised tourist route (the A939), and therefore considered to be of high value.

7.195 **Size and Scale**: From the line of cottages to the west of the junction there would be very little or no visibility of turbine blades over the coniferous treetops in the distance (in winter or summer). The scale of change is judged to be small. The coniferous trees of New Inn Wood that provide screening are unlikely to be felled to open views to the proposed wind farm development, due to the nature of the management regimes adopted for the area. It is therefore unlikely that screening would be lost in these views.

7.196 **Geographical Extent**: Local to the line of cottages to the west of the A939 within Ferness. The cottage and hall to the east of the A939 face away from the Site and would not have theoretical visibility.

7.197 **Impact and Significance**: Although this is a sensitive settlement close to the Site, there would be little or no visibility of the turbines. The introduction of the Proposed Wind Farm Development would give rise to a negligible, not significant impact on this settlement, with the existing screening by trees and forest maintained as is indicated by current felling plans.

Edinkillie

7.198 Edinkillie is made up of a number of properties including Beachans along a minor road on the north side of the River Divie valley, as well as properties around the 18th century Edinkillie Parish Kirk, Glenernie and Aucheorn. It is located at the crossing of the A940 over the River Divie, which is also where the disused railway that now carries the Dava Way crosses the river over the Edinkillie Viaduct (built in the late 19th century). Views from within the Divie valley are largely contained by topography and trees, but views from along the minor road near Beachans Farm, Glenernie and Aucheorn are more open. In the direction of the Site, views from Glenernie are similar to views from Aucheorn, shown in visualisations for Viewpoint 9 (Figure 7.21). From the Beachans road, the view is more elevated, without nearby woodland screening, but from this location Berry Burn Wind Farm is visible to the east, approximately 3 km away.

7.199 **Susceptibility**: Residents are assumed to have high susceptibility to changes in views from their properties.

7.200 **Value**: Residents are assumed to value the views from the settlement. Edinkillie is not a Conservation Area, although it contains listed structures such as the Kirk, the viaduct and the A940 bridge over the River Divie. The A940 itself is popular with tourists. Edinkillie is therefore considered to be of high value.

7.201 **Size and Scale**: From the properties and church within the River Divie Valley there would be no visibility of the Proposed Wind Farm Development. From more elevated parts of the settlement the turbines would be visible as blades seen above forest to the southwest, to the right of the Knock of Braemoray in the views (see Figure 7.21 for Viewpoint 9 at Aucheorn). The turbines would be approximately 5.5 km away at Beachans, and would form features as part of a wider landscape visible from this part of the settlement, which has views of Berry Burn Wind Farm nearby to the east. The Proposed Wind Farm Development would be further from this settlement than the turbines of Berry Burn Wind Farm, but would affect a different part of the view (southwest), and would introduce another group of turbines into this

36 Forestry Commission Scotland (2005) Assich, Laiken and Ferness FDP Mid Term Review

panorama. The scale of change is judged to be high for the Beachans road, but medium for the settlement as a whole.

7.202 **Geographical Extent**: Local to the elevated parts of the settlement. The church and properties within the River Divie valley would not have visibility.

7.203 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on this settlement, as this is a sensitive settlement relatively close to the Site, with elevated locations with views of the turbines over the intervening landscape.

Dava

7.204 Dava is made up of a number of properties around the Dava Junction, the junction on the disused railway that now carries the Dava Way, and also properties at the junctions of the A939 with the A940 and the Lochindorb road. There is woodland and forest around Dava, but it is mostly to the east of the properties, and does not generally affect views towards the Site from the properties. Woodland scrub is growing on the moorland to the north of Dava, with numerous young, self-seeded conifer trees. These trees may in time screen views from Dava, but this assessment assumes that they would not screen views (as a worst case). In the direction of the Site, views from Dava can be represented by visualisations for Viewpoint 7 (Figure 7.19) near Dava Junction.

7.205 **Susceptibility**: Residents are assumed to have high susceptibility to changes in views from their properties.

7.206 **Value:** Residents are assumed to value the views from the settlement. Dava is not a Conservation Area. The A939 is recognised as a tourist route, and the A940 is also popular with tourists. The Dava Way long distance walking route passes the settlement. Dava is therefore considered to be of high value.

7.207 **Size and Scale**: From the properties of Dava there would be views of the Proposed Wind Farm Development on Cairn Duhie. The turbines would be approximately 3.5 to 4 km away. The turbines would be visible beyond the scattered woodland to the north-northwest, on the low form of Cairn Duhie to the west of the Knock of Braemoray (see Figure 7.19 for Viewpoint 7 at Dava Junction). The turbines would form prominent features in the views which currently extend over open moorland and forest with few vertical elements. There would be sections of track visible between the turbines passing in front of the profile of Cairn Duhie (see Figure 7.19). Transformers at the base of some turbines will also be visible[37]. The scale of change is judged to be high for the settlement as a whole.

7.208 **Geographical Extent**: Local to the settlement.

7.209 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on this settlement, as this is a sensitive settlement relatively close to the Site, with open views of the turbines over the moorland landscape without extensive forest screening.

Impacts on Routes

7.210 An analysis of the theoretical and likely actual visibility of the Proposed Wind Farm Development from routes across the study area, particularly those closer to the Site, is set out in Table 7.8: Analysis of Visibility from Routes. The routes that require assessment of impacts include the A96 and the Railway from Inverness to Elgin, the A939, A940, B9007, the Lochindorb road, the Aitnoch to Dulsie road, the Roads that run along the Findhorn Valley, the road over the Darnaway Forest from Coulmony to Lethan, General Wade's road from Dunearn to Cawdor, the Dava Way and NCN1. These are considered below.

7.211 The routes pass residential properties, and while the assessment for the route (or section of the route) can be used as a proxy for the visual impact on views from the properties, it should be recognised that properties often have screening vegetation in their gardens, or are set in woodland.

A96 and the Railway from Inverness to Elgin

7.212 The A96 runs along the coast of the Moray Firth, between Inverness in the west, and Elgin in the east. The Inverness to Elgin railway runs broadly parallel, passing back and forth under the A96 in several places.

7.213 **Susceptibility**: The A96 is an important transport corridor, and although it is used by tourists, road and rail users tend not to be focused on the wider views and surroundings, therefore both road and rail users are assumed to have low susceptibility to changes in views.

7.214 **Value:** These are busy, key routes, passing adjacent to designed landscapes such as Brodie Castle, Newton and Sueno's Stone. The routes are considered to be of medium value.

7.215 **Size and Scale**: There would be theoretical visibility from some sections of the A96, including around Forres, Nairn and Brackley (see Technical Appendix 7.4, Wireframe 3 at Nairn Sainsbury's). There would be theoretical visibility from the railway, also at Forres and Nairn. The majority of both routes would not have theoretical visibility. The closest point to the Site with theoretical visibility, for both routes, is near Brodie, approximately 13.5 km to the north. Given the settled nature of the roadsides through the settlements there would be no actual visibility from within the settlements. There would, however, be views from open sections of the routes. Given the frequent woodlands along the railway, and the settlements along the route, there would be very limited actual visibility from the railway.

7.216 Berry Burn Wind Farm is visible from some sections of the route, predominantly between Nairn and Forres (See Figure 7.8), and other wind farms are also visible from parts of the route (see Figure 7.7). Rothes (both Phases) are predominantly visible between Nairn and Forres, and also in the vicinity of Elgin. Paul's Hill is visible in the vicinity of Nairn and Brodie. Findhorn is visible from Nairn and a section between Brodie and Elgin.

7.217 The scale of change is judged to be small, for both routes as a whole.

[37] Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

7.218 **Geographical Extent**: Localised along the routes.

7.219 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on these routes, as the turbines would not be visible from the majority of the routes, with visibility being limited to short sections.

A939

7.220 The A939 runs from Nairn to Tomintoul, passing the Site along its western boundary, and going via Dava and Grantown-on-Spey. Viewpoints 1, 2, 4 and 10 are representative of views from this route.

7.221 Berry Burn Wind Farm is visible from some sections of this route around Aitnoch and north of the Findhorn Valley (see Figure 7.8) and other wind farms are also visible from stretches of the route (see Figure 7.7). This includes Paul's Hill, which is visible in the vicinity of Aitnoch and to the south of Grantown-on-Spey.

7.222 **Susceptibility**: The highest susceptibility group of road users on this route are tourists, who are assumed to have high susceptibility to changes in views from routes.

7.223 **Value:** This route is recognised as part of the Highland Tourist Route, and forms an important approach to the Cairngorms National Park. It is therefore considered to be of high value.

7.224 **Size and Scale**: There would be theoretical visibility between Laiken Forest and Glaschoil. Although some sections of this route are contained within woodland, or have woodland screening views, there would be long sections of this route with views of the Proposed Wind Farm Development.

7.225 From south of Dava, the Proposed Wind Farm Development would be seen on the low form of Cairn Duhie to the west of the Knock of Braemoray across open ground (see visualisations for Viewpoints 10 and 7). Between Dava and Ferness, the turbines would be seen close to the route with very limited screening by woodland along the route (see visualisations for Viewpoints 4, 1 and 2). The tracks and transformers at the bases of the turbines would be visible from the route as it passes the Site. The mitigation planting introduced around the substation and the access track junction with the A939 will reduce the visibility of these elements from the route. North of the Findhorn valley, the landscape through which the route passes is more wooded, with large areas of coniferous plantation. There would therefore be more limited views of the Proposed Wind Farm Development, as turbine blades above forest along these sections (see Wireframes 1 at the War Memorial and 3 at Nairn, Technical Appendix 7.4). The scale of change is judged to be large for the route as a whole.

7.226 **Geographical Extent**: Widespread along the route.

7.227 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on this route, as this is a sensitive tourist route that passes along the boundary of the Site, with prolonged views of the turbines over open moorland landscapes.

A940

7.228 The A940 runs between Forres and Dava, at the junction with the A939 to the southeast of the Site. It passes near Dallas Dhu distillery, through the Blairs forest, past Logie and Edinkillie and round the foot of the Knock of Braemoray. Viewpoints 3a, 7 and 9 are representative of views from this route. It is a route popular with tourists.

7.229 Berry Burn Wind Farm is visible from some sections of the route, around Beachans and Logie (See Figure 7.8), and Rothes (both phases) Wind Farm is visible for a short section of the route to the south of Forres. However, many sections of the route are wooded, screening outward views. There is limited visibility of other wind farms (see Figure 7.7).

7.230 **Susceptibility**: Road users on this route include local residents and tourists who are considered to have high susceptibility to changes in views.

7.231 **Value**: This route does not pass through designated landscapes, although it passes to the east of the River Findhorn AGLV. The route is considered to be of medium value.

7.232 **Size and Scale**: There would be theoretical visibility between Dava and Logie, and limited visibility south of Forres. The route is approximately 1.5 km from the Site at its closest point, at Knock of Braemoray. Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development, particularly at the southern end of the route (see Viewpoints 9, 3a and 7). The turbines will be visible, with sections of tracks and transformers visible where the bases of the turbines are visible. The scale of change is judged to be medium for the route as a whole.

7.233 **Geographical Extent**: Localised, due to woodland screening the turbines from theoretically visible parts of the route.

7.234 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on this route, as the turbines would be visible in close proximity views from sections of the route that are not contained by forest, between Dava and Dunphail.

B9007

7.235 The B9007 runs from Logie at the junction with the A940 northeast of the Site, and Duthil at the junction with the A938 southwest of the Site, via Ferness. Viewpoints 2, 5 and 8 are representative of views from this route. The section of the route between Logie and Ferness is through a generally wooded landscape, and it runs through open moorland south of Dunearn.

7.236 Berry Burn Wind Farm is visible from some short sections of the route, in proximity to Ferness and near Dunearn at the junction with the minor road to Lochindorb (See Figure 7.8). There is limited visibility of other wind farms (see Figure 7.7) due to either topography or forest.

7.237 **Susceptibility**: Road users on this route include tourists leaving the National Park, but it is not as busy a road as the A939. Susceptibility is judged to be medium.

7.238 **Value**: The route passes through the Drynachan, Lochindorb and Dava Moors SLA and the Cairngorms National Park, and is therefore considered to be of high value.

7.239 **Size and Scale**: Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development. Visibility is limited along the wooded valley between Logie and Relugas, where the road passes alongside the River Findhorn. Where views are possible, such as at Viewpoint 5 near Mount, the turbines would be seen beyond forest plantations. There would be theoretical visibility also at Ferness, approximately 1.6 km from the Site but for most of this section views would actually be screened by woodland. Open views towards the Site can be seen from a short section between Burnside and the location of Viewpoint 8, before the road passes round the Hill of Aitnoch. From this section there would be views of the Proposed Wind Farm Development on the middle distant land to the east of the road. The Proposed Wind Farm Development would not be visible from the B9007 south of the location of Viewpoint 8. Overall, given the limited views of the Proposed Wind Farm Development from this route, the scale of change is judged to be small.

7.240 **Geographical Extent**: Localised, due to woodland that would screen the turbines from those parts of the route that have theoretical visibility.

7.241 **Impact and Significance**: Overall, the introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this route, as the turbines would be screened from the majority of the route by landform and /or woodland.

Lochindorb Road

7.242 Lochindorb Road runs from the A939 south of Dava, and passes to the south of Lochindorb to meet the B9007. It is a single track road with passing places.

7.243 Berry Burn Wind Farm is visible from short sections of the route, in proximity to the B9007 at the western end and the A940 at the eastern end of the route (See Figure 7.8). No other wind farms are visible from the route (see Figure 7.7).

7.244 **Susceptibility**: Road users on this route are few, and are considered to have medium susceptibility to changes in views.

7.245 **Value:** The route lies within the Drynachan, Lochindorb and Dava Moors SLA and is therefore considered to be of high value.

7.246 **Size and Scale**: There would be theoretical visibility for approximately 2 km of the route as it crosses the open moorland between the A939 and Lochindorb. There would be no visibility of the Proposed Wind Farm Development from where the road meets the shores of Lochindorb westwards. The route is approximately 4 km from the nearest turbine at its closest point, south of Dava, from which point the turbines would be prominent elements in views north (see Viewpoint 7). The scale of change is judged to be low for the route as a whole.

7.247 **Geographical Extent**: Localised to a short section of the route.

7.248 **Impact and Significance**: Overall, the introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this route. The turbines would be visible from a short section of the route, in oblique views.

Aitnoch to Dulsie Road

7.249 The Aitnoch to Dulsie road is a minor road running between Dulsie, on the River Findhorn to the west of the Site, and the A939 at Little Aitnoch on the western boundary of the Site. Viewpoint 1 is representative of views from this route.

7.250 Berry Burn Wind Farm is visible from short sections of the route, to the west of Burnside and to the east of the B9007 (See Figure 7.8). Paul's Hill is visible near the junction with the A939 (see Figure 7.7).

7.251 **Susceptibility**: Road users on this route are few, and are considered to have medium susceptibility to changes in views.

7.252 **Value:** The route does not pass through any designated landscapes and is therefore considered to be of low value.

7.253 **Size and Scale**: There is theoretical visibility from the majority of this route across open moorland, becoming screened on the approach to Dulsie by woodland. The route is approximately 1 km from the Site at its closest point, at the junction with the A939. The turbines would be seen on Cairn Duhie to the northeast of the route when travelling eastbound, and tracks and transformers at the bases of the turbines would also be visible for parts of the site that form the west facing slopes of Cairn Duhie. The scale of change is judged to be large for this short route as a whole.

7.254 **Geographical Extent**: Widespread along this route.

7.255 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on this short route, as the turbines would be visible in close proximity views from sections of the route.

Roads that run along the Findhorn Valley

7.256 There is a series of minor roads running along the Findhorn Valley, between Daless in the southwest of the Study Area, and Findhorn Bay to the north of Forres, in the northeast of the Study Area.

7.257 Berry Burn Wind Farm is visible from several sections of the route, including Banchor, Dulsie, Ardclach, the eastern edge of the Darnaway Forest, and Whitemire (See Figure 7.8). There is limited visibility of other wind farms (see Figure 7.7). Rothes Phase I and Rothes Phase II are visible for short sections between Banchor and Ardclach, and north of Whitemire. Paul's Hill Wind Farm is visible from Ardclach, the eastern edge of the Darnaway Forest, and north of Whitemire. Findhorn Wind Farm and the single turbine at Bognie are visible between Dounduff Farm and Findhorn Bay. The actual visibility of these wind farms is reduced, however, by forest and woodland screening along almost all sections of these routes.

7.258 **Susceptibility**: Road users on these minor roads are relatively few, and are considered to have low susceptibility to changes in views.

7.259 **Value:** The minor road at Daless, to the southwest of the Site, passes through the Drynachan, Lochindorb and Dava Moors SLA. To the northeast of the Site a minor road passes along the edge of the River Findhorn AGLV. In these locations, the minor roads are therefore considered to be of high value.

7.260 **Size and Scale**: There are sections of these routes that would have theoretical visibility, predominantly between Banchor and Dounduff Wood in the Darnaway Forest. The route is approximately 3.5 km from the Site at its closest point, Levrattich. However, woodland screens outward views from the majority of the route along the River Findhorn, with occasional open views such as at Levrattich. The scale of change is judged to be small for the route as a whole.

7.261 **Geographical Extent**: Localised, due to woodland screening the turbines from theoretically visible parts of the route.

7.262 **Impact and Significance**: Overall, the introduction of the Proposed Wind Farm Development would give rise to negligible, not significant impacts on these routes, as the turbines would be visible from short sections, with enclosing woodland along the Findhorn Valley screening the majority of views.

Road over the Darnaway Forest from Coulmony to Lethan

7.263 This is a minor road which runs between Lethen House and Coulmony House, passing along the north eastern side of Lethen Bar (258m AOD). The road passes through coniferous woodland on the fringes of the Darnaway Forest for the majority of its length.

7.264 Berry Burn Wind Farm is theoretically visible from the southern end of the route, between Tomnagee and Coulmony House (See Figure 7.8). Rothes Phase I, Rothes Phase II, Paul's Hill, Findhorn and the single turbine at Bognie are all theoretically visible between Tomnagee and Lethen Bar (see Figure 7.7). Outward views are screened from the majority of the route, except between the properties of Tomnagee and Wester Clune, where there are open views to the northeast.

7.265 **Susceptibility**: Road users on this route are few and are considered to have low susceptibility to changes in views.

7.266 **Value:** The route does not pass through any designated landscapes, but runs through coniferous forest and is therefore considered to have views of low value.

7.267 **Size and Scale**: There is theoretical visibility between Coulmony and Lethen Bar, however the road passes through coniferous forest between these locations, screening outward views. The route is approximately 4 km from the nearest turbine at its closest point, Coulmony. The scale of change is judged to be small.

7.268 In the event of forest felling opening views towards the south, the Proposed Wind Farm Development would be visible across the wooded River Findhorn valley to the south. It would be seen in the context of Berry Burn Wind Farm to the southeast, and would be prominent in views south.

7.269 **Geographical Extent**: Very localised, due to woodland screening the turbines from theoretically visible parts of the route.

7.270 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a negligible, not significant impact, as the turbines would be screened by the surrounding woodland for the majority of the route. If areas of forest were felled and views southwards opened up, there would be minor, not significant impact on the route as a whole, as much of the route would remain without views.

General Wade's road from Dunearn to Cawdor

7.271 This is a minor road between Cawdor, on the B9090, and Dunearn, on the B9007, to the west of the Site. Part of the route is the Old Military Road. The route is approximately 4 km from the Site at its closest point, Dunearn.

7.272 Although Berry Burn Wind Farm is theoretically visible from the majority of the route between Dulsie and Urchany (See Figure 7.8), and there is some visibility of other wind farms from the route (see Figure 7.7), woodland along the route screens these wind farms from most views.

7.273 **Susceptibility**: Road users on these minor roads are few and are considered to have low susceptibility to changes in views.

7.274 **Value:** The route does not pass through any designated landscapes after it leaves Cawdor, although it passes over the Dulsie Bridge which has become a landmark since a dramatic flooding event known as the Muckle Spate of 1829, and also Dunearn Iron Age Fort (see Chapter 10: Cultural Heritage and Archaeology). This historic road is therefore considered to be of high value.

7.275 **Size and Scale**: There is theoretical visibility between Dunearn Lodge and Urchany. Between Dulse and Balmore, views are contained by woodland, except at the junction with the Newlands of Fleenas road, where the forest is open and scattered, and views east can be obtained. This is the location of Wireframe 2 in Technical Appendix 7.4. North of that, the road descends into the Muckle Burn valley from which there are no views. Between Balmore and Urchany, woodland screens views. Around Clunas the immediate views are more open, but forest to the southeast would screen the Proposed Wind Farm Development from views. From Urchany there would be visibility of the Proposed Wind Farm Development as turbines seen over forest, approximately 11 km away. From this location Berry Burn Wind Farm is also visible. Overall, the scale of change is judged to be small for the route as a whole.

7.276 **Geographical Extent**: Localised, due to woodland screening the turbines from theoretically visible parts of the route.

7.277 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this route. The turbines would be visible from short sections of the route travelling southeast, with intervening woodland filtering views.

Dava Way

7.278 The Dava Way runs north – south through the study area between Forres and Grantown-on-Spey, broadly parallel to the A940 and A939. Viewpoints 7, 9 and 10 are representative of views from this route.

7.279 Berry Burn Wind Farm is visible between Beachans and Knock of Braemoray (See Figure 7.8). There is limited visibility of other wind farms (see Figure 7.7). Rothes Phase I and Rothes Phase II are visible for a short section to the south of Forres and there is intermittent theoretical visibility of Findhorn and the single turbine at Bognie between Forres and Logie, however the surrounding woodland limits distant views in this section of the route.

7.280 **Susceptibility**: Recreational walkers on the Dava Way are focused on views of their surroundings and are therefore considered to have high susceptibility to changes in views.

7.281 **Value:** The route lies within the Drynachan, Lochindorb and Dava Moors SLA and the Cairngorms National Park in its southern section, and is a long distance walking route highlighted on maps. The route is therefore considered to be of high value.

7.282 **Size and Scale**: There is theoretical visibility between Altyre Woods and Beachans, and between Dava and Glaschoil. The route is approximately 3 km from the Site at its closest point, Dava Junction. Although some sections of this route are contained within woodland, or have woodland screening views, there would be sections of this route with views of the Proposed Wind Farm Development. In these views, the Proposed Wind Farm Development would be seen as a prominent feature of the moorland to the west of the route, and would relate to views of Berry Burn, Paul's Hill and Rothes Wind Farms to the east. The scale of change is judged to be medium for the route as a whole.

7.283 **Geographical Extent**: Widespread as prolonged views of the Proposed Wind Farm Development would be seen between Glaschoil and Dava when walking northwards, although views from other sections of the route are more restricted due to woodland.

7.284 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on this route, as the turbines would be visible in close proximity views from sections of the route.

NCN1

7.285 National Cycle Route 1 runs between Ballintore north of Nigg in the northwest of the Study Area, passing around the edge of the Moray Firth along a combination of A roads, B roads and minor roads, via Cromarty, Inverness, Culloden, Nairn, Forres and Elgin in the northeast of the Study Area.

7.286 **Susceptibility**: Cyclists on NCR1 are largely recreational users, whose attention is often on views of their surroundings and are therefore considered to have high susceptibility to changes in views.

7.287 **Value:** The route is a national cycle route and is therefore considered to be of high value.

7.288 **Size and Scale**: There would be theoretical visibility from this route around Kinloss, Forres, Nairn, Urchany and sections on the Black Isle. The closest point of the route with views of the Proposed Wind Farm Development is Urchany, approximately 11 km away. Given the frequent settlements and woodland areas along this route, and the distance to the Proposed Wind Farm Development, actual visibility would be limited. It is judged that the scale of change to the experience of this route would be small.

7.289 **Geographical Extent**: Localised to sections of the route.

7.290 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a minor, not significant impact on this route, as the turbines would be visible from short sections of the route, at distances of over 11 km.

Impacts on Viewpoints

7.291 The seventeen viewpoints across the Study Area are assessed below. Visualisations for each have been provided, see Figures 7.12 to 7.29.

Viewpoint 1: Little Aitnoch

- Grid Reference: 297077, 840869
- LCT: Uplands - Open Uplands
- Landscape designation: None
- Direction of view: Northeast
- Distance to nearest turbine: 1.0 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.12

7.292 This viewpoint is located on a minor road to the southwest of the Site, near a property called Little Aitnoch. The viewpoint is representative of views from the road, from the property, and similar views that can be obtained from the A939 adjacent to the Site.

7.293 The view towards the Site is from the roadside, over a foreground of rough pasture fields within a shallow valley (the upper Tomnarroch Burn) with woodlands along field boundaries, along the minor road adjacent to the viewpoint, and along the A939 which passes across the view on the other side of the small valley. Beyond that road the ground rises over rough moorland with intermittent woodland to a low conical hill that is Cairn Duhie. To the left (north) of the view, forest covers the middle distant horizon. Higher, more distant hills can be seen to the southeast of the viewpoint, through the nearby trees. In other directions, the view extends over wooded lowlands to the coast to the north, and to distant hills to the west, although the views are foreshortened to the south by the Hill of Aitnoch.

7.294 **Susceptibility**: The viewpoint is on a minor road with relatively few viewers, but is used to represent the residential property of Little Aitnoch and the A939 which is a recognised tourist route. Residents and tourists are assumed to have high susceptibility to changes in views.

7.295 **Value:** The viewpoint represents users of the A939 which is a recognised tourist route, and is therefore considered to be of high value.

7.296 **Size and Scale**: No existing wind farms are visible from this location. The Proposed Wind Farm Development would be seen on the moorland over Cairn Duhie, close to the viewpoint. The turbines would be seen as a group of turbines, most of them to the north (left) of the top of Cairn Duhie. There would be some overlapping of turbines within the group, which would be seen as an irregular array from this location. The turbines would be seen as large man-made structures in this view, larger in scale than the pylons visible near the forest to the north of the site. In addition, the access tracks between the turbines would be visible, and external transformers at the feet of the turbines would also be visible[38]. The visibility of the substation would be reduced with time due to the proposed planting around it, which is designed to integrate with the existing woodland in the view (see Chapter 3: Design Evolution and Alternatives). The scale of change is judged to be large for receptors at this viewpoint.

7.297 **Geographical Extent**: Localised as this viewpoint represents views from the minor road and a section of the A939 to the southwest of the Site.

7.298 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on receptors at this viewpoint, given the proximity to the Site and therefore the prominence of elements of the Proposed Wind Farm Development which are visible.

Viewpoint 2: Ferness

- Grid Reference: 296246, 844806
- LCT: River Valleys - Narrow Wooded Valley
- Landscape designation: None
- Direction of view: South-southeast
- Distance to nearest turbine: 1.6 km
- Theoretical visibility: Hubs: 4; Tips: 10
- Figure Number: 7.13

7.299 This viewpoint is located at the southern (downhill) end of the row of properties that makes up the main part of Ferness, on the B9007. The location is representative of views from Ferness, and has been selected instead of locations further uphill along the road, for example near the telephone box or at the junction with the A939, because it has greater theoretical visibility of the Proposed Wind Farm Development than locations further north. This viewpoint is representative of views from the settlement and the properties therein.

7.300 The view is from the B9007, the western side of which is occupied by a line of southeast facing properties. The view across the road is to a sloping field of rough grazing, up towards the A939 road, beyond which there is a coniferous plantation on the horizon. It is therefore a view contained by the woodland along the A939.

7.301 **Susceptibility**: This viewpoint represents residents in Ferness and users of the A939 which is a recognised tourist route. Residents and tourists are assumed to have high susceptibility to changes in views.

7.302 **Value:** The viewpoint represents users of the A939 which is a recognised tourist route, and is located within an area proposed as a Conservation Area. It is therefore considered to be of high value.

7.303 **Size and Scale**: The Proposed Wind Farm Development theoretically would be visible as a small number of blades and hubs passing over the horizon to the south-southeast. However, the coniferous forest screens all views of the turbines. The Forestry Commission Scotland plans[39] for the New Inn Wood plantation on the east side of the A939 (shown on Figure 4.1: Infrastructure Layout), indicate that 'group selection' felling and replanting would take place, i.e. in small coups, over a long period of time, with the aim of maintaining overall woodland cover. This is very unlikely to result in clear felling that would allow views to the turbines. The line of trees along the field boundary across the view (from Ferness to the A939) is thin, with some mature trees. These currently play an important role in screening the views in this direction. These trees are owned by Glenferness Estate, and are scheduled for long term retention, lasting beyond the lifetime of the Proposed Wind Farm Development. With retained forest screening, the scale of change is judged to be small for receptors at this viewpoint. The Applicant is currently in discussions with the Estate regarding the extension of this line of trees to enhance the screening effect.

7.304 **Geographical Extent**: Localised to part of Ferness.

7.305 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a negligible, not significant impact on receptors at this viewpoint, as woodland is indicated to be retained.

Viewpoint 3a: A940, above Kerrow and 3b Knock of Braemoray

- Grid Reference: 300046, 841888 (3a) and 301108, 841811 (3b)
- LCT: Uplands - Open Uplands
- Landscape designation: None
- Direction of view: West
- Distance to nearest turbine: 1.7 km on the A940, 2.8 on the summit
- Theoretical visibility: Hubs: 20; Tips: 20 (both locations)
- Figure Numbers: 7.14 and 7.15

7.306 These viewpoints are located at a lay-by on the A940 on the slopes of the Knock of Braemoray, at a point where the view overlooks Kerrow Farm, and on the top of the Knock of Braemoray. The viewpoints are considered together to represent views seen from the layby where people stop, from the road, and from the hill behind (the Knock of Braemoray). Local residences including Kerrow and other nearby properties such as Braemoray Lodge and Culfearn would have similar views, but are at lower elevations. The Dava Way passes around

[38] Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

[39] Forestry Commission Scotland (2005) Assich, Laiken and Ferness FDP Mid Term Review.

the other side of the Knock of Braemoray from this viewpoint, but there may be walkers who climb the hill as a detour. This viewpoint can also be used to represent views from the route on the section of disused railway to the south of the hill which carries the Dava Way north of Dava Junction.

7.307 Views from the roadside layby are contained to the north, east and south by the slopes of the Knock of Braemoray and the woodland along the A940. On higher ground on the Knock of Braemoray they are more open, with a full 360°panorama available from the summit. To the west, the view is over the Dorback Burn valley below the road, and across the open, gently sloping moorland that makes up the flanks of Cairn Duhie. The distant view is made up of the low profiles of Craig Tiribeg, Hill of Aitnoch, and the hills at the edge of the Cairngorms National Park, with open views across the coastal lowlands and the Moray Firth towards the very distant uplands of Easter Ross.

7.308 **Susceptibility**: This viewpoint is used to represent several different locations and groups of people, including residents, walkers, tourists and road users; it is judged that these receptors are of high susceptibility to changes in views.

7.309 **Value:** The Knock of Braemoray is a 'Landmark Hill' listed in the Moray SPG[40], and the A940 is used by tourists. The value at these locations is high.

7.310 **Size and Scale**: As these locations have an elevated location with respect to the Site, the Proposed Wind Farm Development would be seen as an array of turbines, with ground level infrastructure also visible, including tracks and transformers[41]. The proximity of the Site means that the turbines would be large in this view, and the north south spread of the turbines would be perceptible. The array of turbines would be irregular, with some instances of overlapping turbines. While the design of the Proposed Wind Farm Development sought to reduce overlapping of turbines in this view, the locations of the turbines were restricted by on-site constraints, such that the irregularity of the layout was unavoidable from this direction.

7.311 From the top of the Knock of Braemoray, other wind farms can be seen that are not visible from the road. Farr, Paul's Hill, Berry Burn, Rothes (phases 1 and 2), Bognie Farm and Findhorn Wind Farms are visible around the panorama, with Berry Burn Wind Farm approximately 6.2 km away to the east. The Proposed Wind Farm Development would be closer to the Knock of Braemoray than Berry Burn Wind Farm is, and would introduce turbines in another direction of view. The scale of change is judged to be large for receptors at these viewpoints.

7.312 **Geographical Extent**: These viewpoints represent the views seen from a localised area to the west of the Site.

7.313 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on receptors in short distance, elevated views from the west.

Viewpoint 4: A939, West of Aitnoch

- Grid Reference: 297996, 839712
- LCT: Uplands - Open Uplands
- Landscape designation: at the edge of the Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: North
- Distance to nearest turbine: 2.0 km
- Theoretical visibility: Hubs: 19; Tips: 20
- Figure Number: 7.16

7.314 This viewpoint is located on the A939, to the west of the property of Aitnoch. It is located where the A940 turns northwards, and gains open views to the northeast. The viewpoint is used to represent views from the A939, a recognised tourist route, and the residential property at Aitnoch, as well as to represent views from the edge of the Drynachan, Lochindorb and Dava Moors SLA (although looking away from the SLA).

7.315 The view from this location is of the road crossing undulating moorland with areas of broadleaf woodland and a property to the east. To the west, the moorland rises up the slopes of the Hill of Aitnoch. To the northeast, the view is across a semi improved grazing field, with low woodland beyond and a small lochan (Lochan Tùtach) partially hidden beyond the woodland. Beyond the lochan, moorland rises gently, with some scattered trees, to the low top of Cairn Duhie to the north, and the Knock of Braemoray to the northeast. Between and beyond these hills lies distant lowland forest. The route of the A940 is visible as a horizontal line across the lower slopes of the Knock of Braemoray. Berry Burn Wind Farm is visible beyond and to the right of Knock of Braemoray, and two turbines of Paul's Hill are also visible in that direction.

7.316 **Susceptibility**: Receptors include road users, tourists and residents, the latter groups are of high susceptibility to changes in views.

7.317 **Value:** The A939 is part of the Highland Tourist Route, and the Drynachan, Lochindorb and Dava Moors SLA extends to the road from the south. The value of the view at this viewpoint is judged to be high.

7.318 **Size and Scale**: The Proposed Wind Farm Development would be seen over the low profile of Cairn Duhie. The turbines would form a group which would be perceived as regular, having depth in the view away from the viewpoint, and a perceptible regularity of spacing between turbines, in spite of some overlapping of turbines in the view. Due to the proximity of the viewpoint to the Site, the turbines would be seen as large elements in this view. The turbines would not affect views to the Knock of Braemoray, or views in other directions across the moorland of the SLA. The tracks serving some of the southern turbines would be

[40] Moray Council (2013) Supplementary Planning Guidance: Moray Onshore Wind Energy

41 Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

visible from this location. The scale of change is judged to be large for receptors at this viewpoint.

7.319 **Geographical Extent**: Localised as this viewpoint represents views from the A939 corridor to the south of the Site around Aitnoch.

7.320 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on receptors at this viewpoint, given the proximity of the Site.

Viewpoint 5: B9007, near Mount

- Grid Reference: 298018, 846318
- LCT: River Valleys - Narrow Wooded Valley
- Landscape designation: None
- Direction of view: South
- Distance to nearest turbine: 2.4 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.17

7.321 This viewpoint is located on the B road that runs between Ferness and Relugas, to the north of Mount. The viewpoint represents views from the north of the Site, from the B road and from local properties. The properties along the roadside, such as Score and Airdrie Mill have views screened by woodland, but properties on the south side of the road, such as Mount, Little Lyne and Muckle Lynn may have views. These properties are represented by this viewpoint.

7.322 The viewpoint is situated at the end of a track that leads into Airdrie Plantations, and is a location with views out of the immediate forest. The views are contained by forest to the east and west, although Shaw Hill can be seen to the north (also forested). To the south, the forest is set back from the road, and the low profile of Hill of Aitnoch is visible beyond undulating terrain with woodland areas. The horizon from this location is almost completely forested, and the Hill of Aitnoch is the only open, distant land in view.

7.323 **Susceptibility**: This viewpoint is on a minor road, users of which are likely to be local residents. Viewers at this location (away from properties) are judged to have medium susceptibility to changes in views.

7.324 **Value:** The viewpoint is on a minor road with few users, in a forested area with limited scenic qualities and the view is therefore judged to be of low value.

7.325 **Size and Scale**: The Proposed Wind Farm Development would be seen as turbine blades over the middle distance trees to the south, in front of Hill of Aitnoch. The layout of the turbines would be difficult to discern given the partial screening by forest, such that the overlapping of blades and uneven spacing of turbines within the array may be less noticeable than if no forest was present. The turbines would form features emerging above the forest in this view, and given the short distance to the Site, they would be large elements in the view. As the bases of the turbines would be screened by the forest, the scale of the turbines may be difficult to discern for some viewers. Over time, the screening afforded by forest trees will change, as different plantation areas are felled or young trees grow up to screen the view. Overall, and considering the forest changes, the scale of change is judged to be large for receptors at this viewpoint.

7.326 **Geographical Extent**: Localised to limited sections of this minor road.

7.327 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on receptors at this viewpoint.

Viewpoint 6: Ardclach Bell Tower

- Grid Reference: 295382, 845323
- LCT: River Valleys - Narrow Wooded Valley
- Landscape designation: None
- Direction of view: Southeast
- Distance to nearest turbine: 2.6 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.18

7.328 This viewpoint is located at the bell tower that overlooks Ardclach in the River Findhorn valley. The bell tower is a Scheduled Monument open to the public, with very limited parking and a steep, stepped footpath up to the building. Further information about the building is found in Chapter 10: Cultural Heritage and Archaeology. This viewpoint is used to represent the view from the bell tower, and although it could be used to represent other views at the edge of the River Findhorn valley, locations with open views are relatively limited.

7.329 The view from the bell tower is contained to the west and north by plantation woodland near the building. To the southeast, the view is over the River Findhorn valley with the steep sides of the valley obscured by woodland. Broadleaf woodland occupies the steep valley sides, with coniferous forest on the upper slopes and obscuring the horizon. A line of large pylons crosses the view on the far side of the valley, in front of the forest.

7.330 **Susceptibility**: This viewpoint represents views seen by visitors to the Scheduled Monument, who are judged to have high susceptibility to changes in views.

7.331 **Value:** The scenic qualities of the immediate setting of the bell tower in the dramatic yet enclosed wooded valley, and the fact that the bell tower is visited by tourists leads to a judgement of high value for this viewpoint.

7.332 **Size and Scale**: The Proposed Wind Farm Development would be seen as turbine hubs and blades over the forest on the far side of the River Findhorn Valley. Although the pylons are existing man-made functional structures in the view, the turbines would introduce man-made structures of a different nature and scale, and would introduce movement to this view. The short distance to the Site means that the turbines would be seen as large structures in the

view, even though lower parts of the turbines would be screened by forest on the other side of the valley. Although the design of the Proposed Wind Farm Development sought to optimise the appearance of the layout from this location, there would be some overlapping of turbine blades in this view, due to on-site constraints (see Chapter 3: Design Evolution and Alternatives). The scale of change is judged to be large for receptors at this viewpoint.

7.333 **Geographical Extent**: this is a localised view, seen only from the bell tower and its immediate surroundings. Other views from this side of the Findhorn valley are limited because of woodland.

7.334 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant visual impact at this viewpoint.

Viewpoint 7: Dava Junction

- Grid Reference: 300868, 839260
- LCT: Uplands - Open Uplands
- Landscape designation: at edge of the Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: northwest
- Distance to nearest turbine: 3.6 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.19

7.335 This viewpoint is on the Dava Way disused railway line, above the A940, but is used to represent views from that road as well as views from the long distance recreational route and the residential properties of Dava. Dava Junction, once a junction on the railway line, is a popular place for walkers wanting to join the walking route from the road.

7.336 At this point on the route there is woodland to the east of the route, and no existing wind farms are visible. Berry Burn Wind Farm is visible from a short distance further north along the route, on higher ground. The view towards the Site is over the busy A940 road, and across moorland with scattered conifer scrub and young trees. The profile of Cairn Duhie can be seen to the northwest. The Knock of Braemoray is seen to the north, and the Hill of Aitnoch lies to the west.

7.337 **Susceptibility**: Viewers at this location include walkers using the Dava Way for recreation, road users including tourists, and local residents also see similar views. The susceptibility of receptors to changes in view at this location is judged to be high.

7.338 **Value:** The Dava Way is a popular long distance route, and the A940 is a road popular with tourists. The landscape to the south of the viewpoint is designated as part of an SLA. The value of views from this location is therefore judged to be high.

7.339 **Size and Scale**: The Proposed Wind Farm Development would be seen over the low profile of Cairn Duhie. The turbines would form an irregular array, resulting from the lines of turbines within the layout overlapping to the left, and spreading out to the right of the group. Due to the proximity of the viewpoint to the Site, the turbines would be seen as large elements in this view, above the conifer scrub on nearby moorland. The turbines would not affect views to the Knock of Braemoray, or views in other directions across the moorland of the SLA. There would be sections of track visible between the turbines passing in front of the profile of Cairn Duhie. Transformers at the base of some turbines will also be visible[42]. The scale of change is judged to be large for receptors at this viewpoint.

7.340 **Geographical Extent**: Localised, around Dava Junction.

7.341 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a major, significant impact on receptors at this viewpoint, given the proximity of the Site.

Viewpoint 8: B9007, Old Military Road

- Grid Reference: 294192, 838869
- LCT: Uplands - Open Uplands
- Landscape designation: Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: Northeast
- Distance to nearest turbine: 4.4 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.20

7.342 This viewpoint is at a large layby on the B9007, near to the point where an old military road (General Wade's Road) diverges from the route of the B9007, as the road bends to the northeast. The viewpoint is used to represent views seen by road users and walkers on the old military road, as well as views from the Drynachan, Lochindorb and Dava Moors SLA. Similar views may be possible from nearby residential properties such as Dunearn and Refouble. The B9007 is one of the few routes north-south over the hills along the northern edge of the Cairngorms National Park, running from Duthill near Carrbridge to Ferness.

7.343 The view from this location is contained by the moorland slopes of the Hill of Aitnoch to the south and east. To the west the view extends over low undulating moorland towards low hills. To the north, the view is down the moorland slopes towards a lowland landscape of forest plantations, and the distant Moray Firth. The form of Cairn Duhie can be made out, but is not a notable landmark in the view. The Knock of Braemoray is not visible and no other wind farms are visible.

7.344 **Susceptibility**: The viewpoint is used to represent views seen by road users and walkers, who are judged to have medium susceptibility to changes in views.

7.345 **Value:** Although it is located on a B road remote from any properties, this viewpoint represents the views from the SLA, and value is therefore judged to be high.

7.346 **Size and Scale**: The Proposed Wind Farm Development would be seen on Cairn Duhie, as an array of turbines on the horizon. The layout would form a group of turbines with some

[42] Transformers at the bases of the turbines are not shown in the photomontages. They will be located adjacent to each turbine.

overlapping of turbine blades. Given the distance to the Site, the turbines would be seen as prominent features in the view, but would be perceived as being in the middle distance in the view. Tracks would be visible where the bases of the turbines are visible. The scale of change is judged to be medium for receptors at this viewpoint.

7.347 **Geographical Extent:** Localised.

7.348 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant visual impact at this viewpoint.

Viewpoint 9: A940, Aucheorn

- Grid Reference: 302049, 847220
- LCT: Uplands - Open Uplands
- Landscape designation: None
- Direction of view: Southwest
- Distance to nearest turbine: 5.3 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.21

7.349 This viewpoint is located on the A940 near the cluster of properties at Aucheorn. It is representative of glimpsed views from the A940 from the northeast of the Site, from the Dava Way which passes along the disused railway to the east of the viewpoint, and from local properties.

7.350 The view is contained to the north and east by topography and woodland around the viewpoint. To the west, the view extends over the field adjacent to the road, and over the treetops of middle distance woodlands. The horizon is made up of low hills, including Cairn Duhie and the Knock of Braemoray to the south. No wind farms are visible from this location.

7.351 **Susceptibility**: The viewpoint is used to represent views seen by local residents, and walkers on the Dava Way, who are judged to have high susceptibility to changes in views.

7.352 **Value:** The A940 is a popular route with tourists and the Dava Way is a popular long distance walking route. The value of views in this location is judged to be high.

7.353 **Size and Scale**: The Proposed Wind Farm Development would be visible on the low profile of Cairn Duhie, emerging above the middle ground woodland in views to the southwest, and partially screened by it. While the layout would appear as a relatively regular array of turbines if it were fully visible, woodland screening means that only a few turbines would actually be visible. Given the distance to the Site, the turbines would appear as prominent features in the view, and would introduce movement on the horizon. The scale of change is judged to be medium for receptors at this viewpoint.

7.354 **Geographical Extent:** Localised, as views from the A940 are glimpses through woodland.

7.355 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on receptors at this viewpoint.

Viewpoint 10: A939 and Dava Way

- Grid Reference: 301425, 834551
- LCT: Uplands and Glens
- Landscape designation: Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: north-north west
- Distance to nearest turbine: 7.9 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.22

7.356 This viewpoint is located on the Dava Way long distance walking route, that runs along a disused railway line, and is at this point adjacent to the A939, a recognised tourist route. It is located approximately 2.3 km from where the A939 leaves the Cairngorms National Park, although the park boundary lies approximately 600 m away to the east of the railway line. This viewpoint is used to represent views from the tourist route, and the Dava Way, as well from the edge of the National Park. This section of the A939 is one of the few routes that run north-south over the hills along the northern edge of the Cairngorms National Park, running from Grantown-on-Spey to Dava (where it meets the A940).

7.357 The views from this location are a 360° panorama across open moorland, with views along the broad Anaboard Burn valley between the Carn na Glaisneach and Craig Tiribeg. Towards the north-northwest, the view is along the A939, over open moorland and rough grazing. Cairn Duhie forms the low ground to the left (west) of the Knock of Braemoray, which itself is seen beyond a coniferous plantation located on the railway line. To the right of the view a small hillock leads the eye up Craig Tiribeg, with the Hill of Aitnoch visible beyond in the distance.

7.358 **Susceptibility**: This viewpoint is located on a large area of open moorland with almost no vertical elements in the view. The viewpoint is on a long distance walking path, the Dava Way, and adjacent to a main tourist route with large numbers of tourist viewers. Tourists and recreational walkers are assumed to have high susceptibility to changes in views.

7.359 **Value**: The viewpoint is located on the Dava Way, adjacent to the Highland Tourist Route, and also close to the National Park boundary. The value at this location is high.

7.360 **Size and Scale**: No existing wind farms are visible from this location. The Proposed Wind Farm Development would be seen on the low horizon to the north-northwest between Knock of Braemoray and Hill of Aitnoch. The turbines would be seen in the middle distance, as a compact group, with limited overlapping of turbine blades. Sections of access tracks between turbines would be visible from this location. The Proposed Wind Farm Development would be seen ahead of the view travelling north. It would introduce vertical elements and movement to the view. The scale of change is judged to be high.

7.361 **Geographical Extent**: Widespread as this viewpoint represents views from along the Dava Way, the A939 and hills either side of the Anaboard Burn valley to the edge of the National Park.

7.362 **Magnitude of Change and Impact**: Overall it is judged that the impact would be major, significant.

Viewpoint 11: Carn nan Gabhar above Lochindorb

- Grid Reference: 298028, 833774
- LCT: Uplands and Glens
- Landscape designation: Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: north
- Distance to nearest turbine: 7.9 km
- Theoretical visibility: Hubs: 17; Tips: 20
- Figure Number: 7.23

7.363 This viewpoint is located on the track that passes over Carn nan Gabhar, above and to the southeast of Lochindorb. It represents views seen by walkers using this path, and is also used to represent potential views of the Proposed Wind Farm Development in combination with Lochindorb Castle (see Chapter 10: Cultural Heritage and Archaeology).

7.364 There would be no visibility of the Proposed Wind Farm Development from the road as it passes the loch, from the shores of Lochindorb, or from the castle island. This viewpoint at a more elevated location, with theoretical visibility of the Proposed Wind Farm Development, has been selected to represent views overlooking the castle and Lochindorb.

7.365 Views from the viewpoint are panoramic from the Carn nan Gabhar ridge, over Lochindorb and the extensive open moorlands to the west of the B9007, visible as a ribbon road through the moorland. To the southwest, the upland plateau at the edge of the Cairngorms National Park is visible. Views to the south and east are restricted by the form of Carn Ruigh Chorrach and Craig Tiribeg. The view towards the Site is down the hill slopes to Corrycharcle and Lochindorb, with Lochindorb Castle sitting isolated on an island. The view is framed to the right (east) by Craig Tiribeg, and the ridge of low hill beyond Lochindorb is the Hill of Aitnoch.

7.366 From this location no other wind farms are visible, but from the summit of Carn Ruigh Chorrach, the view eastwards includes Berry Burn and Paul's Hill Wind farms.

7.367 **Susceptibility**: Walkers on this path are few, but there are those who climb up to gain views over Lochindorb. Susceptibility is judged to be high.

7.368 **Value:** This viewpoint lies within the Drynachan, Lochindorb and Dava Moors SLA, and there are scenic qualities to the view over Lochindorb, such that the value of the view is judged to be high.

7.369 **Size and Scale**: The Proposed Wind Farm Development would be visible on the middle distant moorland, partially beyond the low profile of Hill of Aitnoch. It would be seen beyond Lochindorb, but not above the Castle, which is set further to the left (west) in the view. The turbines to the left (west) of the group would be screened by the Hill of Aitnoch so that only their blades would be visible. Sections of access tracks would be visible between the turbines to the right (east) of the group, where views extend to the ground level of the Site. The Proposed Wind Farm Development would form a prominent feature in the view, and may lead the eye away from Lochindorb, the current focus of the view. The scale of change is judged to be medium for receptors at this viewpoint.

7.370 **Geographical Extent**: Localised to the ridge top.

7.371 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on receptors at this viewpoint.

Viewpoint 12: Carn Kitty

- Grid Reference: 309000, 842750
- LCT: Open Uplands
- Landscape designation: near the edge of the Drynachan, Lochindorb and Dava Moors SLA
- Direction of view: west
- Distance to nearest turbine: 10.6 km
- Theoretical visibility: Hubs: 16; Tips: 18
- Figure Number: 7.24

7.372 This viewpoint is located at the summit of Carn Kitty, adjacent to the trig point. Carn Kitty is a 'Landmark Hill' listed in the Moray SPG[43], and lies close to the Moray/Scottish Highlands boundary. It is approximately 6.8 km from the Cairngorms National Park boundary.

7.373 Berry Burn Wind Farm is laid out to the north and northwest of the summit, over Carn Ghuibhais. The closest Berry Burn turbine to the summit of Carn Kitty is approximately 700 m away. Paul's Hill Wind Farm is located to the southeast, seen in front of Ben Rinnes, the closest turbine being approximately 2 km from the top of Carn Kitty. Rothes Wind Farm is visible to the northeast.

7.374 The view towards the Site is between the turbines of Berry Burn Wind Farm, out across moorland running down to the River Divie valley. The Knock of Braemoray forms a prominent landmark hill in the middle distance, and the land rises to hills in the far distance to the west and south. The view from this location includes panoramic views over the coastal lowlands and the Moray Firth, as well as across the hills to the east towards Ben Rinnes.

7.375 **Susceptibility**: Given the proximity of wind turbines to this summit viewpoint, viewers would have had close views of turbines on the way up to the viewpoint, and would have low susceptibility to changes in the distance.

7.376 **Value:** Carn Kitty is a 'Landmark Hill' listed in the Moray SPG, and approximately 800 m from the council boundary that also forms the boundary of the Drynachan, Lochindorb and Dava Moors SLA. It is judged to have views of high value.

7.377 **Size and Scale**: The Proposed Wind Farm Development would be seen in the distance to the west, to the right (north) of the Knock of Braemoray, which would screen the southernmost

[43] Moray Council (2013) Supplementary Planning Guidance: Moray Onshore Wind Energy

turbines such that only tips are visible. The Proposed Wind Farm Development would be further from the viewpoint than Berry Burn or Paul's Hill turbines, but at a similar distance away as to Rothes Wind Farm (approximately 10 km away). Overall, given the presence of turbines close to the viewpoint, the introduction of the additional group of turbines in the distance is judged to be a small scale change.

7.378 **Geographical Extent**: Localised around Carn Kitty.

7.379 **Impact and Significance**: The impact of the Proposed Wind Farm Development at this viewpoint is judged to be minor, not significant.

Viewpoint 13: Carn Allt Laoigh

- Grid Reference: 292240, 831258
- LCT: Uplands - Open Uplands
- Landscape designation: on the boundary between Drynachan, Lochindorb and Dava Moors SLA, Cairngorms National Park
- Direction of view: Northeast
- Distance to nearest turbine: 11.8 km
- Theoretical visibility: Hubs: 14 Tips: 20
- Figure Number: 7.25

7.380 This viewpoint is located at the top of Carn Allt Laoigh, a top in a rugged ridge of hills that form the boundary to the Cairngorms National Park. The National Park boundary crosses over this hill. The viewpoint is representative of views from the National Park and Drynachan, Lochindorb and Dava Moors SLA around the viewpoint, as well as being used to represent views from the B9007 road that runs from Duthill near Carrbridge to Ferness.

7.381 The view from the hill top is a 360° panorama over the rugged ridge running east-west, with higher hills to the south (within the National Park), and lower rolling moorland hills to the north, across the SLA and Dava Moor. To the south there is a panorama across the Cairngorm plateau, and to the north the view extends to the lowlands, with areas of forest a characteristic of the coastal landscape visible from this location. In the distance to the north, the view extends across the Moray Firth to Easter Ross.

7.382 To the northeast, the view is down the slopes of Carn Allt Laoigh to the Dava moorland with Lochindorb forming a focus of the view. The ridge in front of Lochindorb is Carn nan Clach Garbha, with the B9007 passing it on the far side. Craig Tiribeg forms a prominent hill to the right (east) of Lochindorb, and the Knock of Braemoray is visible beyond. Berry Burn Wind Farm[44] is visible to the right (east) of the Knock of Braemoray, with Rothes Wind Farm (both phases) visible beyond, and Paul's Hill Wind Farm visible on the horizon further to the right. Findhorn and Bognie Wind Farms, although theoretically visible, are screened by intervening forest in this view.

7.383 **Susceptibility**: There are relatively few visitors to this location, there are no worn paths, although there are scars of vehicle wheels near the viewpoint. However, recreational walking receptors are judged to have high susceptibility to changes in views.

7.384 **Value:** There are scenic qualities to the view, valued through the designation of the landscapes around the viewpoint, and value is therefore judged to be high.

7.385 **Size and Scale**: The Proposed Wind Farm Development would be visible on the middle distant moorland, on the low profile of Cairn Duhie, partially beyond the low profile of Hill of Aitnoch. The turbines to the right (east) of the group would be screened by the Hill of Aitnoch so that only their blades would be visible. The turbines would not interrupt the horizon, but would be seen with the backdrop of the lowlands and the sea beyond. The Proposed Wind Farm Development would form a feature in that part of the view where the landscape makes the transition from moorland to forested lowlands. The turbines would not be new features in the view from this location, but would be slightly closer than those at Berry Burn Wind Farm (which is approximately 19 km away). The scale of change is judged to be medium for receptors at this viewpoint.

7.386 **Geographical Extent:** Widespread, as similar views can be seen from other summits and north facing slopes around Carn Allt Laoigh.

7.387 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a moderate, significant impact on receptors at this viewpoint, despite the distance to the Site and the sense of separation between the Site and the viewpoint.

Viewpoint 14: Mill Buie

- Grid Reference: 309028, 850091
- LCT: Upland Moorland and Forest
- Landscape designation: None
- Direction of view: southwest
- Distance to nearest turbine: 12.7 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.26

7.388 This viewpoint is located at the top of Mill Buie, near the trig point. Mill Buie is a 'Landmark Hill' listed in the Moray SPG[45], and affords panoramic views in all directions. The land to the north of Mill Buie slopes down to lowland with forest and field patterns, across the coastal lowlands to the Moray Firth. The Bognie Farm turbine and Findhorn Wind Farm are visible on this lower lying land. In other directions the views extend over rounded hills, with Rothes, Berry Burn and Paul's Hill Wind Farms seen as large groups of turbines on the hills. Rothes Wind Farm is approximately 7.5 km away to the south, Berry Burn is 4.3 km away to the south, and Paul's Hill is 8.4 km away to the east.

[44] Berry Burn Wind Farm is seen partially constructed on the photographs in Figure 7.25. The remaining turbines that were not present at the time of photography (22 September 2013) have not been modelled in, but the spread and scale of the wind farm is perceptible, and the wireframe can be used as an additional reference.

[45] Moray Council (2013) Supplementary Planning Guidance: Moray Onshore Wind Energy

7.389 The view towards the Site is over the moorland slopes of Mill Buie and Lone Hill, with coniferous plantations extending down into the distance. The Knock of Braemoray is seen beyond the forest, forming a prominent landmark hill in the middle distance.

7.390 **Susceptibility**: The views from this summit are seen by recreational walkers, who are judged to have high susceptibility to changes in the view.

7.391 **Value:** Mill Buie is a Moray Landmark Hill, and views from it are panoramic and judged to have medium value.

7.392 **Size and Scale**: The Proposed Wind Farm Development would be seen in the distance to the west, to the right (north) of the Knock of Braemoray. The Proposed Wind Farm Development would introduce an additional group of turbines into the panorama, but would be further from the viewpoint than the existing wind farms. Overall, the introduction of the Proposed Wind Farm Development in the distance is judged to be a small scale change.

7.393 **Geographical Extent**: Localised to high ground at Mill Buie.

7.394 **Impact and Significance**: The impact of the Proposed Wind Farm Development at this viewpoint is judged to be minor, not significant.

Viewpoint 15: Carn an Uillt Bhric

- Grid Reference: 283800, 839100
- LCT: Uplands - Open Uplands
- Landscape designation: Lochindorb SLA
- Direction of view: East
- Distance to nearest turbine: 13.8 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.27

7.395 This viewpoint is at the summit of Carn an Uillt Bhric by the trig point. It forms a high point in the hills between the River Findhorn and the River Nairn valleys to the north of Moy, and affords views down the River Findhorn valley. This viewpoint is used to represent high elevation views from the west of the Study Area.

7.396 The view from this location is a 360° panorama over the summit plateau, which is of moorland with peat hags. The foreground view is of the moorland, and the convex form of the hill means that there is little middle ground visible, but that the view extends to distant hills to the east. The panorama includes the Cairngorm Plateau, the Monadhliath mountains, and the mountains of Easter Ross.

7.397 The view towards the Site is over foreground moorland plateau, with views of the winding and narrow, wooded Findhorn valley with moorland either side. The distant landscape includes the Knock of Braemoray, Carn Kitty and Carn na Lòine in front of the more distant Ben Rinnes. Paul's Hill and Rothes Wind Farms are visible set on the hills in the distance, with Berry Burn visible in front of them.

7.398 **Susceptibility**: There are few visitors to this location, on the remote moorland plateau, with no evidence of worn paths. Walkers who do come to this plateau are judged to be of medium susceptibility as this is not a hill top that many people would come to in order to see the view.

7.399 **Value**: This viewpoint is a remote hill top on a plateau located within the SLA, and is judged to be of medium value.

7.400 **Size and scale**: The Proposed Wind Farm would be seen as a group of turbines on the low moorland to the left (north) of the Knock of Braemoray, with some turbines seen in front of that hill. It would be seen below the horizon and in front of Rothes and Berry Burn Wind Farms, without extending the spread of turbines across the panorama. Given the distance to the Site, the turbines would form small features in the large scale panorama from this location. The Proposed Wind Farm would form an additional group of turbines in the view east from this location, although it would be closer to the viewpoint than the other existing wind farms. The scale of change to this view is judged to be small.

7.401 **Geographical Extent:** Widespread, as similar views can be seen from other summits and north facing slopes on the plateau.

7.402 **Impact and significance**: The visual impact at this location would be minor, not significant.

Viewpoint 16: Califer Viewpoint

- Grid Reference: 308400, 857072
- LCT: Coastal Lowlands - Rolling Farmlands and Forest
- Landscape designation: None
- Direction of view: South-southwest
- Distance to nearest turbine: 16.8 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.28

7.403 This viewpoint is located at the formalised viewpoint at Califer, which is laid out with seating and a panoramic waymarker on a stone plinth. The location is marked as a viewpoint and picnic area on OS maps. There is a car park off the road, and picnic benches are provided. The route from the car park to the viewpoint passes through a memorial garden, with young trees, benches and plaques.

7.404 The view from the viewpoint is a panorama over the coastal landscapes and the Moray Firth, to Easter Ross and Sutherland in the distance. The view is contained to the east by topography and woodland near the viewpoint.

7.405 The view towards the Site is at the edge of the panorama, with views further south contained by the woodland and trees of the memorial garden. The view is inland, over undulating forest covered hills that create multiple horizons in the view. The horizon is formed by the low profiles of Knock of Braemoray and Hill of Aitnoch.

7.406 Bognie Farm turbine is located on the slopes below the viewpoint near Rafford. Findhorn Wind Farm is seen as four turbines on the coast to the north. Berry Burn and Paul's Hill Wind Farms, although theoretically visible, are screened from view by the trees around the car park.

7.407 **Susceptibility**: This is a place that people visit, to look at the view and spend time, and receptors are therefore judged to have high susceptibility to changes in views.

7.408 **Value:** This is an advertised viewpoint, shown on OS maps and road signs. There are scenic qualities to the panorama over the Moray Firth to Easter Ross and Ben Wyvis. Value is therefore judged to be high.

7.409 **Size and Scale**: The Proposed Wind Farm would be located on the low hills inland of the viewpoint, seen as a group of distant turbines against the backdrop of hills beyond. The turbines would form a small part of the panorama from this viewpoint, and while they would relate to the Findhorn Wind Farm turbines as similar landscape elements, they would be inland, away from the focus of the panorama which is the Moray Firth. The turbines of the Proposed Wind Farm Development would be partially screened by forest in the intervening landscape, and would therefore be seen as turbine blades over the tops of forest trees. In addition, trees near the viewpoint, along the roadside, may grow to screen distant views in this direction in time. The scale of change is judged to be small for receptors at this viewpoint.

7.410 **Geographical Extent**: Localised to the viewpoint and Burgie Hill.

7.411 **Impact and Significance**: The introduction of the Proposed Wind Farm Development would give rise to a negligible, not significant impact on receptors at this viewpoint, given the position of the Proposed Wind Farm Development at the periphery of the panorama from this location, and the distance to the Site.

Viewpoint 17: Creagan a' Chaise

- Grid Reference: 310400, 824200
- LCT: Northeast Hills (Cairngorms)
- Landscape designation: Cairngorms National Park
- Direction of view: Northwest
- Distance to nearest turbine: 21.4 km
- Theoretical visibility: Hubs: 20; Tips: 20
- Figure Number: 7.29

7.412 This viewpoint is located at the summit cairn of Creagan a' Chaise, the highest point on the Hills of Cromdale ridge. The Hills of Cromdale lie at the northern boundary to the National Park, and divide Strath Avon from Strathspey. This viewpoint is used to represent higher elevation views from the southeastern part of the Study Area.

7.413 The view from the top is a 360° panorama with the Cairngorm Mountains to the south, Easter Ross and Ben Wyvis to the northwest, and the coastal landscapes of the Moray Firth to the north. The foci of the panorama include the mountains visible and the Firth of Forth. Paul's Hill and Rothes Wind Farms are visible to the north.

7.414 The view towards the site includes the summit area in the foreground, but the slopes down from the summit are hidden by the convex topography of the hill. In the distance the view is over Strathspey, with Grantown laid out and clearly visible. Beyond this low moorland hills divide Strathspey from the coastal landscapes along the Moray Firth. The moorland hills include Carn Kitty and Carn na Lòine, and the Knock of Braemoray is visible but does not form a notable landmark.

7.415 Berry Burn, Paul's Hill and Rothes Wind Farms are visible to the north, as discrete groups of turbines on rounded hills. Paul's Hill Wind Farm is approximately 15 km to the north of the viewpoint, and Berry Burn Wind Farm is approximately 18 km away.

7.416 **Susceptibility**: This hill top is visited by walkers, who are judged to have high susceptibility to changes in views.

7.417 **Value:** This hill top has scenic qualities that include both the mountains of the Cairngorms and the Moray Firth. The viewpoint represents views from the National Park, and value is therefore judged to be high.

7.418 **Size and Scale**: The Proposed Wind Farm Development would be seen as a group of turbines separate from Berry Burn, Paul's Hill and Rothes Wind Farms, on lower moorland to the north of the viewpoint, beyond the settled valley of the River Spey. It would be further from the view than Paul's Hill and Berry Burn Wind Farms, and would not break the horizon from this elevated viewpoint. The scale of the change to the view is judged to be small.

7.419 **Geographical Extent**: Localised along the Hills of Cromdale ridge.

7.420 **Impact and Significance**: The visual impact at this location would be minor, not significant.

Cumulative Assessment

Cumulative Landscape and Visual Methodology

7.421 The CLVIA considers the potential impacts of the addition of the Proposed Wind Farm Development, against a baseline landscape that includes wind farms that may or may not be present in the landscape in the future, i.e. wind farms that are consented but not yet built, and/or undetermined planning applications.[46] The wind farms are assumed to be present in the landscape for the CLVIA.

7.422 The methodology for the CLVIA follows that of the LVIA set out at the beginning of this chapter. The scale and size of cumulative change focusses on:

- The arrangement of wind farms in the landscape or view, e.g. developments seen in one direction or part of the view (combined views), or seen in different directions (successive views in which the viewer must turn) or developments seen sequentially along a route;

[46] No Pre-application design/scoping stage schemes were included in the CLVIA following consultation with Highland Council and SNH, however several pre-application design/scoping stage schemes are shown on Figure 7.9.

- The relationship between the scale of the wind farms, including turbine size and number;
- The position of the wind farms in the landscape, e.g. in similar landscape or topographical context;
- The position of the wind farms in the view, e.g. on the skyline or against the backdrop of land; and
- The distances between wind farms, and their distances from the viewer.

Cumulative Baseline

7.423 Cumulative developments forming part of the baseline for the CLVIA include consented schemes and those that are valid but undetermined applications or applications at appeal, listed in Table 7.10: Wind Farms considered in the Cumulative Assessment, as well as those that form part of the LVIA baseline (see Table 7.5: Wind Farms Operational and Under Construction). The locations of all of the wind farms considered in the CLVIA are shown on Figure 7.9. Although each of these wind farms is included in the baseline for the CLVIA, the assessment is focused on the relationship of the Proposed Wind Farm Development with the closest wind farms to the Site.

Table 7.10: Wind Farms considered in the Cumulative Assessment (in addition to those listed in Table 7.5)

Wind Farm	Status[47]	No. of Turbines	Blade Tip Height (m)	Distance[48] (km)
Hill of Glaschyle	Application Submitted	12	99.5	6.5
Tom nan Clach	Consented	17	110	12.5
Cluny Farm	Consented	1	61	13.8
Moy	Consented	20	126	17.5
Kellas	Application Submitted	8	110	20.6
Hunthill	Consented	4	67	25.4
Glen Kyllachy	Application Submitted	20	110	26.2
Brown Muir[49]	Application Submitted	19	126	29.8
Fearndearn	Appeal/Public Inquiry	1	55.7	32.1
Allt Duine	Appeal/Public Inquiry	31	125	33.0
Dorenell	Consented	59	126	34.8

7.424 Pre-application Design/Scoping sites are not considered in the assessment, but are shown on Figure 7.9, and listed below.

- Glenbeg;
- Poll Lochaig;
- Meikle Hill; and
- Davidston.

Receptors of Cumulative Impacts

7.425 The receptors of cumulative impacts are the landscape, where one or more wind farms form features in the landscape, and people (visual receptors) who may see more than one wind farm when moving round the landscape or at static locations. As cumulative impacts can be experienced as sequential views of different wind farms, impacts on views from routes are important.

Potential Cumulative Impacts

7.426 Potential cumulative impacts include:

- Combined impacts, when developments are seen in one direction or part of the view;
- Successive impacts, when developments are seen in different directions (the viewer must turn to see them); or
- Sequential impacts, when developments are seen sequentially along a route, but not necessarily all visible from the same locations.

7.427 For cumulative impacts, there is also the perceived patterns of wind farm development, such that a viewer may be aware of other wind farms in the area, even if they are not visible from the static location or route the viewer is on.

Mitigation

7.428 Landscape and visual considerations, including the relationship of the Proposed Wind Farm Development with other wind farms nearby, played a key role in the progression of the layout design of the Proposed Wind Farm Development. Consideration included the size and layout of the turbines. It is considered that 110 m to blade tip is in keeping with current existing and proposed wind farms, and the layout forms a group of turbines rather than a grid that would contrast with the layout of other nearby schemes. There are no wind farms adjacent to the Proposed Wind Farm Development to which it had to relate directly, and it was therefore designed to be a coherent 'stand-alone' development. The design of the Proposed Wind Farm Development is described in Chapter 3: Design Evolution and Alternatives.

Residual Impacts

Patterns of Development and Cumulative Landscape Impacts

7.429 The pattern of development across the area out to 60 km from the Site, is described using maps collated by SNH[50], THC[51] and RenewablesUK[52] as well as data collated in Table 7.10: Wind Farms considered in the Cumulative Assessment.

[47] Development status as of August 2013.

48 Distance between the turbines of the Proposed Wind Farm Development and the turbines of the other wind farm.

49 Since the completion of the cumulative assessment, Brown Muir Wind Farm has been withdrawn. This does not alter the findings of the assessment.

[50] SNH (2012) On-shore Windfarms in Scotland (August 2012) online map: http://www.snh.gov.uk/docs/A763435.pdf

51 THC (December 2012) *Highland Windfarm Developments*

7.430 There is a trend for existing or consented development to occur around the Moray Firth, across the uplands of Easter Ross (such as Beinn Tharsuinn, Novar and Fairgurn Wind Farms) and across the northern fringes of the Monadhliath and Cairn Gorm mountain ranges (such has Hill of Towie, Rothes, Paul's Hill, Ton nan Clach and Moy Wind Farms) and on either side of the Great Glen (such as Farr, Dunmaglass, Corrimony and Millenium Wind Farms). Across the lower lying areas of Aberdeenshire there are more numerous developments, with smaller sized developments also. The trends for wind farm proposals also follow this pattern, with clear avoidance of the Cairngorms National Park and the designated landscapes of Wester Ross.

7.431 Within the study area of 35 km of the Proposed Wind Farm Development Site, Wind Farm developments tend to follow the Rolling Uplands/Uplands/Open Uplands/Upland Moorland and Forestry LCTs, which form a transitional zone between the mountains of the Cairngorm or Monadhliath massifs and the coastal lowlands, running south-west to east across the study area (see Figures 7.9 and 7.3). Exceptions to this trend are Allt Duine and Dorenell Wind Farms on higher ground, within Uplands and Glens and Open Uplands with Steep Slopes LCTs respectively; and Findhorn Wind Farm on the coast.

7.432 As a result of the trends described above, wind farms are becoming more common features in upland landscapes around the study area, with turbines located within Rolling Uplands/Uplands/Open Uplands/Upland Moorland and Forestry LCTs. Higher elevation LCTs are more likely to have views of wind farms in the wider landscape from hill summits, and the Uplands and Glens and Open Uplands with Steep Slopes LCTs also contain wind farms. From lower elevation LCTs, wind farms are features in the backdrop views of higher ground, and there are also occasional wind farms within lower elevation LCTs (small scale developments of turbines under 50 m have not been studied in this assessment).

7.433 The Proposed Wind Farm Development, located in Uplands LCT, would follow the trend identified above. It would be located between Hill of Glaschyle/Berry Burn and Tom nan Clach Wind Farms, and may therefore be seen to be part of the pattern of wind farm development, albeit reducing the separation between wind farms in Moray and wind farms in the Scottish Highlands. In spite of this, it is judged that Proposed Wind Farm Development would be seen and perceived as part of the line of developments that stretches from Farr to Rothes across the study area.

7.434 The introduction of the Proposed Wind Farm Development would increase in the number of wind farms present within the area made up of the Rolling Uplands/Uplands/Open Uplands/Upland Moorland and Forestry LCTs, but it is judged that there will not be further significant cumulative impacts on those LCTs (compared with those identified in the LVIA), in the cumulative scenario. This is because there is an existing trend of development in these areas, and the Proposed Wind Farm Development is separated from the Hill of Glaschyle and Tom nan Clach Wind Farms such that there will not be a change in character to Uplands/Open Uplands 'with wind farms' as a result of the introduction of the Proposed Wind Farm Development.

Cumulative Visual Impacts

7.435 Combined and successive visibility of the Proposed Wind Farm Development with other wind farms is illustrated in Figures 7.10 and 7.11. These figures illustrate that there is extensive visibility of wind farms across the study area in the absence of the Proposed Wind Farm Development (all colours except green). The introduction of the Proposed Wind Farm Development would extend visibility of turbines into areas where currently no wind farms are visible (green areas) for the Dorback Burn and Anaboard valley along the A939, and for very limited areas on the north side of the River Findhorn. These latter areas however, are largely influenced by woodland, and actual visibility is therefore unlikely. For most locations with theoretical visibility of the Proposed Wind Farm Development, there is theoretical, if not actual visibility of other turbines.

7.436 Key areas of combined or successive visibility of the Proposed Wind Farm Development with other wind farms (overlap of ZTVs) include:

- The Knock of Braemoray, as an elevated location between the Proposed Wind Farm Development and Hill of Gaschyle, Berryburn and Paul's Hill Wind Farms, each at relatively close proximity;
- The Hills of Cromdale and Ben Rinnes, with panoramic views of the spread of wind farms across the study area from a more elevated position;
- The high plateau around Carn nan Tri-tighearnan and Carn an t-Sean-liathanaich, with nearby views of Moy and Tom nan Clach Wind Farms, and views south-west towards Farr, Glen Kyllachy and Allt Duine, as well as north-eastwards along the uplands; and
- Coastal areas around Nairn, Forres, Findhorn and on the Moray Firth, with theoretical visibility of multiple wind farms on the uplands horizon inland to the south. However, actual visibility is much reduced for views from Nairn, Culbin and around Forres due to woodland and settlement screening.

7.437 The paragraphs below sets out the cumulative assessment of combined and successive views from static locations such as settlements and viewpoint, using those locations considered in the LVIA.

Settlements

7.438 **Ferness**: No cumulative impact as theoretical visibility of Tom nan Clach Wind Farm is screened by local woodland and forest.

7.439 **Edinkillie**: Hill of Glaschyle and Berry Burn Wind Farms are considerably closer to the settlement than the Proposed Wind Farm Development. It is judged that there would be no further significant impact arising from the Proposed Wind Farm Development.

7.440 **Dava**: Limited visibility of Tom nan Clach Wind Farm as a distant element to the west. It is judged that there would be no significant cumulative impact.

[52] Renewables UK, *UK* Wind *Energy Database* (UKWED) http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm

Viewpoints

7.441 **Viewpoint 1, Little Aitnoch**: Hill of Glaschyle Wind Farm is visible as blade tips over Cairn Duhie, and Tom nan Clach Wind Farm is visible from sections further west along the minor road. Given the proximity of the Proposed Wind Farm Development relative to other wind farms, it is judged that there would be no further significant impact.

7.442 **Viewpoint 2, Ferness**: See settlement.

7.443 **Viewpoint 3a, A940, above Kerrow and Viewpoint 3b, Knock of Braemoray**: From the A940, views are westwards, and include Tom nan Clach Wind Farm on the horizon. From the top of the hill, panoramic views include Hill of Glaschyle, Berry Burn and Pauls Hill Wind Farms lying within 10 km to the north-east and east, as well as more distant wind farms to the north-east and south-west, with Farr visible beyond Tom nan Clach Wind Farm. The Proposed Wind Farm Development would be located close to the Knock of Braemoray, and would affect the view by being seen to the west, between Hill of Glaschyle and Tom nan Clach Wind Farms. This is a location from which the spread of wind farms from the south-west (Farr and Tom nan Clach) can be seen to extend past the viewpoint and away to the north-east. The Proposed Wind Farm Development would appear to make the connection between the wind farms to the east of the hill, and those in the distance to the west. It is judged that from the viewpoint at the top of the Knock of Braemoray (Viewpoint 3b), the scale of change in perception of the spread of turbines resulting from the addition of the Proposed Wind Farm Development would give rise to a moderate (significant) cumulative impact. From the A940, the presence of Tom nan Clach Wind Farm in the distance would mean that the Proposed Wind Farm Development is an additional wind farm seen considerably closer to the viewpoint than Tom nan Clach Wind Farm. However, it is judged that there would be no significant cumulative impact arising from the introduction of the Proposed Wind Farm Development as a second discrete development in the view.

7.444 **Viewpoint 4, A939, West of Aitnoch**: Hill of Glaschyle is visible beyond the north (left) side of Knock of Braemoray from this viewpoint, while Berry Burn Wind Farm is seen on the south (right) side of that hill. The Proposed Wind Farm Development would relate visually to these wind farms, as a similar group of turbines, but closer to the viewer. While there will be an additional wind farm in the view, it is judged that the cumulative impact (over and above that identified in the LVIA) would not be significant.

7.445 **Viewpoint 5, B9007, near Mount**: Tom nan Clach Wind Farm is theoretically visible from this location, but is screened by forest. It is judged that there would be no further significant impact.

7.446 **Viewpoint 6, Ardclach Bell Tower**: Hill of Glaschyle and Tom nan Clach Wind Farms are theoretically visible from this location, but are screened by forest. It is judged that there would be no significant cumulative impact.

7.447 **Viewpoint 7, Dava Junction**: No other wind farms are visible – no cumulative impact.

7.448 **Viewpoint 8, B9007, Old Military Road**: Hill of Glaschyle is visible beyond the Site, and Tom nan Clach Wind Farm is visible in the opposite direction on the hill horizon. The Proposed Wind Farm Development would be seen in front of Hill of Glaschyle Wind Farm, and would bring turbines closer to the viewer, in a direction where turbines are present in the view. While the Proposed Wind Farm Development would increase the number of turbines present in the view, it would not occupy a new part of the panorama and it is judged that there would be no further significant impact.

7.449 **Viewpoint 9, A940, Aucheorn**: Tom nan Clach Wind Farm is visible beyond the Site, but Hill of Glaschyle turbines are visible to the north-east, over the tree tops close to the viewpoint. The Proposed Wind Farm Development would extend the influence of turbines closer to the viewer in views to the south-west, but would not give rise to a further significant effect due to screening by woodland and the distance to the Site being greater than to the Hill of Glaschyle turbines.

7.450 **Viewpoint 10, A939 and Dava Way**: The view from this location is contained within the Anaboard Burn valley, and no other wind farms are visible. No cumulative impact.

7.451 **Viewpoint 11, Carn nan Gabhar above Lochindorb**: Tom nan Clach Wind Farm is visible to the west, on the horizon beyond Dava Moor, but no other wind farms are visible from the viewpoint on the track. The Proposed Wind Farm Development would be visible beyond Lochindorb, as a separate development in a different part of the view from Tom nan Clach. There is judged to be no significant cumulative impact arising from the introduction of the Proposed Wind Farm Development as a second discrete development in the view.

7.452 **Viewpoint 12, Carn Kitty**: The view towards the Site is between the turbines of Berry Burn Wind Farm. The Hill of Glaschyle turbines are visible to the north-west, and being beyond those of Berry Burn and not far from them, may be difficult to distinguish from Berry Burn Wind Farm. Tom nan Clach Wind Farm is seen on the distant horizon to the west. The Proposed Wind Farm Development would be introduced as a group of turbines seen beyond the Knock of Braemoray, further from the viewpoint than the Hill of Glaschyle turbines. Given the presence of turbines, both near and far, in many parts of the panorama from this hill, it is judged that there would be no further significant impact.

7.453 **Viewpoint 13, Carn Allt Laoigh**: From this location, Hill of Glaschyle Wind Farm is visible to the north-east, as a group of turbines to the left (north) of Knock of Braemoray, while Berry Burn, Rothes and Pauls Hill Wind Farms are visible to the right (east) of that hill. Tom nan Clach Wind Farm is visible to the north-west of the viewpoint, with a few turbines of Moy Wind Farm visible but indistinguishable beyond Tom nan Clach turbines. The Proposed Wind Farm Development would be introduced as an additional group to the left (west) of Hill of Glaschyle, as a group of turbines closer to the viewer than the other wind farms to the north-east. However, it would not be as close to the viewpoint as Tom nan Clach. The Proposed Wind Farm Development would form part of an array of wind farms made up of Pauls Hill, Rothes, Berry Burn, Hill of Glaschyle, Findhorn and the Proposed Wind Farm Development. While the influence of turbines would be extended across the view to the north-east, it is

Tom nan Clach Wind Farm that would continue to be the most prominent development from this location. It is judged that the introduction of the Proposed Wind Farm Development would not give rise to a significant cumulative impact.

7.454 **Viewpoint 14, Mill Buie**: From this hill top, the Hill of Glaschyle Wind Farm is visible to the south-west, with Tom nan Clach Wind Farm on the distant horizon beyond, seen in front of Farr and Glen Kyllachy Wind Farms. The introduction of the Proposed Wind Farm Development between Hill of Glaschyle and Tom nan Clach Wind Farms would slightly extend the spread of turbines across the view, and would be perceptible as further from the viewer than Hill of Glaschyle Wind Farm. Given the spread of wind farms across the panorama seen from this viewpoint (including Berry Burn and Pauls Hill Wind Farms to the south), the introduction of the Proposed Wind Farm Development in front of Tom nan Clach Wind Farm is judged not to give rise to a further significant impact.

7.455 **Viewpoint 15, Carn an Uillt Bhric**: Hill of Glaschyle Wind Farm is seen in the distance to the north-east, in the context of, but slightly separate from the existing wind farms at Berry Burn, Pauls Hill and Rothes. Tom nan Clach Wind Farm is visible to the south of the viewpoint, but Moy Wind Farm is not visible from Carn an Uillt Bhric. The Proposed Wind Farm Development would be introduced in front of Berry Burn Wind Farm, and although it would bring turbines closer to the viewpoint in the view north-east, it would not be the closest wind farm to the viewpoint (which is Tom nan Clach). It is judged that there would not be a significant cumulative impact.

7.456 **Viewpoint 16, Califer**: Bognie Farm and Cluny Farm turbines are the closest developments to this viewpoint, although they may be screened from view by local woodlands. Hill of Glaschyle Wind Farm is theoretically a prominent feature in views south-south-west (at approximately 9 km away), but is partially screened by trees near the viewpoint. Tom nan Clach Wind Farm, on the horizon to the south-east, is also theoretically visible, but at approximately 29 km will be a small element in the view. The Proposed Wind Farm Development will be seen beyond nearby trees, as a group of turbines set between Hill of Glaschyle and Tom nan Clach Wind Farms, both in terms of view direction, but also in terms of distance. It is judged that, given the distance to the Site, and the fact that these views are away from the panorama of the Moray Firth, that there would be no further significant impacts.

7.457 **Viewpoint 17, Creagan a' Chaise**: Tom nan Clach Wind Farm is visible on the horizon to the north-west, with Moy turbines theoretically visible beyond, but indistinguishable from those of Tom nan Clach Wind Farm. Turbine tips of Hill of Glaschyle, although theoretically visible, are unlikely to be perceptible. The introduction of the Proposed Wind Farm Development, as an additional discrete group of turbines in the context of Tom nan Clach and the existing wind farms will increase the number of groups of turbines in the panorama, but is judged not to give rise to a significant cumulative impact.

Sequential cumulative impacts

7.458 Sequential cumulative impacts are considered for the routes across the study area that were assessed in the LVIA.

7.459 **A96 and the Railway from Inverness to Elgin**: From this route, the Proposed Wind Farm Development would form one of a series of wind farms seen at different stages along the route, although all views of wind farms to the south are intermittent with local screening along the route. Given the distance from the Site and the limited locations with actual visibility of the Proposed Wind Farm Development, there will not be a further significant impact on this route with sequential cumulative views.

7.460 **A939**: From this route, there would be no other wind farms visible until north of Dava, beyond which the Proposed Wind Farm Development would be visible as the closest wind farm to the route, with sequential views of Hill of Glaschyle, Berry Burn, Pauls Hill and Tom nan Clach at various stages. Although the Proposed Wind Farm Development would affect the experience of this route, it is judged that there would be no further significant impact beyond that identified in the LVIA.

7.461 **A940**: From this route, Tom nan Clach Wind Farm is visible from the road as it passes round the west side of the Knock of Braemoray, and in intermittent views (where screening allows) as far north as Logie. Hill of Glaschyle is also visible from between the Knock of Braemoray and Logie, as well as from the section closer to Forres. Hill of Glaschlye Wind Farm, however, is closer to the route than Tom nan Clach Wind Farm. There are therefore sequential views of wind farms close to and at a distance from this route (including existing wind farms). The introduction of the Proposed Wind Farm Development close to the route as it passes round the Knock of Braemoray, and visible from limited sections further north, would reinforce this experience with an additional development near the route. It would be further from the route (at 1.5 km) than the turbines of Hill of Glaschyle, the closest turbine of which is 1.2 km from the route. Although the Proposed Wind Farm Development would affect the experience of this route, it is judged to be no further significant impact beyond that identified in the LVIA.

7.462 **B9007**: From this route, Hill of Glaschyle Wind farm is visible from around Milltown and near the Hill of Aitnoch. Visibility of Tom nan Clach Wind Farm extends from Ferness to the Lochindorb road. There are therefore views of different wind farms along this route (including existing wind farms), although the section from Logie to Ferness is largely enclosed in woodland. The Proposed Wind Farm Development would be introduced relatively close to the route, and would add a further development visible from it. Although it would form the most prominent development from the route, it is judged that there would be no further significant impact on the sequential experience of this route beyond that identified in the LVIA.

7.463 **Lochindorb road**: Tom nan Clach is visible from this road as it passes Lochindorb. The Proposed Wind Farm Development would introduce an additional wind farm seen from this route, along a section with Berry Burn and/or Tom nan Clach Wind Farms being visible. The route would pass through a landscape with wind farms at a distance from the route in

different directions. Although the Proposed Wind Farm Development would be visible from the route in sequence with Berry Burn and Tom nan Clach Wind Farms, it is judged not to give rise to a further significant impact beyond that identified in the LVIA.

7.464 **Aitnoch to Dulsie road**: Hill of Glaschyle and Tom nan Clach Wind Farms are visible from this route, as relatively distant wind farms on the horizon to the north-east and south-west respectively. The Proposed Wind Farm Development would introduce turbines close to the route, prominent in views when travelling east. However, there are judged to be no further significant impacts beyond those identified in the LVIA.

7.465 **Roads that run along the Findhorn Valley**: Hill of Glaschyle and Tom nan Clach Wind Farms are visible intermittently from limited sections of these wooded routes. The introduction of the Proposed Wind Farm Development would not give rise to a further significant impact.

7.466 **Road over the Darnaway Forest from Coulmony to Lethan**: From this route, the Proposed Wind Farm Development would be seen in the context of Hill of Glaschyle in front of Berry Burn Wind Farm to the south-east, and Tom nan Clach Wind farm to the south-west. It is judged that there will be no further significant impacts beyond those identified in the LVIA.

7.467 **General Wade's road from Dunearn to Cawdor**: From this route, the Proposed Wind Farm Development would be seen in the context of Tom nan Clach Wind Farm to the south, and Hill of Glaschyle Wind Farm that forms part of the Berry Burn and Pauls Hill Wind Farm group to the east. The introduction of the Proposed Wind Farm Development would not give rise to further significant impacts beyond those identified in the LVIA.

7.468 **Dava Way**: From this route, there would be no other wind farms visible until north of Dava, beyond which the Dava Way passes to the east of the Knock of Braemoray, very close to the Berry Burn Wind Farm site, and the Hill of Glaschyle site. The Proposed Wind Farm Development would be visible as a middle distance wind farm to the north from the southern part of the route (south of Dava Junction), with other wind farms being more prominent and closer to the route once north of Dava Junction. The Proposed Wind Farm would be further from the route than Hill of Glaschyle and Berry Burn Wind Farms. It is judged that there would be no further significant impact beyond that identified in the LVIA.

7.469 **NCN1**: From this route, the Proposed Wind Farm Development would form one of a series of wind farm seen at different stages along the route. Views of wind farms to the south of the route as it passes along the south side of the Moray Firth are intermittent with local screening along the route. Given the distance from the Site and the limited locations with actual visibility of the Proposed Wind Farm Development, there will not be a further significant impact on this route with sequential cumulative views.

Summary of Cumulative Relationships

7.470 The closest wind farms to the Proposed Wind Farm Development are Hill of Glaschyle, and Berry Burn Wind Farms. The Knock of Braemoray stands between Berry Burn and the Site, but not between the Site and Hill of Glaschyle. Tom nan Clach Wind Farm is the closest wind farm to the south-west, and has an intermittently overlapping ZTV with the Proposed Wind Farm Development. In general, however, the Proposed Wind Farm Development would be seen as a discrete group of turbines set to the west of the Knock of Braemoray, but following the same development trend as is seen across the study area, with wind farms located in Rolling Uplands/Uplands/Open Uplands/Upland Moorland and Forestry LCTs.

Implications for Designated Landscapes

7.471 This section describes the implications of the Proposed Wind Farm Development for designated areas in the Study Area. Observations are drawn from the assessment sections for landscape, visual and cumulative impacts above.

Cairngorms National Park

7.472 The Cairngorms National Park boundary is located 7.8 km to the south of the Proposed Wind Farm Development, the northern boundary of the National Park is defined by the upland area of the Strathdearn Hills above Strath Spey.

7.473 The Special Landscape Qualities associated with the National Park are outlined in the SNH commissioned report (2010) and include:

- Magnificent mountains towering over moorland, forest and strath;
- Vastness of space, scale and height;
- Strong juxtaposition of contrasting landscapes;
- A landscape of layers, from inhabited strath to remote, uninhabited upland;
- 'The harmony of complicated curves'; and
- Landscapes both cultural and natural.

7.474 Long distance views from upland areas are characteristic of the National Park, with views north from Cromdale and the Cairngorm Mountains across the surrounding settled straths being a key feature of the landscape. A number of existing wind farms are visible in these panoramic views, including Paul's Hill, Rothes, and Berry Burn Wind Farms to the North, Farr Wind Farm to the northwest and other wind farms are visible beyond those considered here.

7.475 The Proposed Wind Farm Development would be visible from limited upland summits located within the Cairngorms National Park, appearing as a separate group of turbines in a similar lowland hill setting to the existing Berry Burn, Paul's Hill and Rothes Wind Farms in distant views northwards from the Hills of Cromdale and the Cairngorm Mountains.

7.476 Impacts on the landscape of the National Park have been assessed in this chapter (assessment of landscape impacts on LCTs), and includes minor, not significant impacts identified for the Strathdearn Hills that extend across the northern boundary of the National Park within the study area. Other areas within the National Park were identified as having limited visibility at long distances, and were unlikely to have significant landscape effects (see Table 7.6: Landscape Character Types considered as Landscape Receptors). There will therefore be no significant impacts on the landscape character of areas of the National Park. Significant

landscape impacts were identified for an area within 3.5 km of the Site, of Open Uplands LCT, which forms a small part of the wider setting of the National Park.

7.477 In the visual assessment, the ZTV (Figure 7.1) indicates that there is limited visibility of the Proposed Wind Farm Development from within the National Park, but judgements regarding visual impacts include:

- A939 – major (although much of the visibility from this route is from sections outside the National Park)
- Dava Way – moderate (although much of the visibility from this route is from sections outside the National Park)
- A9007 – minor (there would be no visibility from within the National Park)
- Viewpoint 10: A939 and Dava Way – major (just outside the National Park)
- Viewpoint 13: Carn Allt Laoigh – moderate (on the National Park boundary)
- Viewpoint 17: Creagan a' Chaise – minor

7.478 The presence of an additional group of turbines in views from the National Park would not introduce visibility of wind farm development from substantial new areas of the National Park, and the Development would appear in the context of the existing pattern of wind farm development to the north outside the National Park. It is judged that the introduction of the Proposed Wind Farm Development would not significantly affect the Special Qualities of the National Park. In addition, it is judged that although there would be some significant impacts on the landscape and views in the vicinity of the Site, this would not amount to a significant impact on the setting of the National Park.

7.479 In a cumulative scenario in which consented and application stage wind farms are also present in the landscape, there would be views from the hill summits at the northern edge of the National Park, of a series of wind farms outside the National Park to the north. The Proposed Wind Farm Development would be seen as one of this series, between Tom nan Clach and Hill of Glaschyle Wind Farms. It is judged that the cumulative impacts would not affect the reasons for which the area was designated.

7.480 The Proposed Wind Farm Development, when assessed in the LVIA and the cumulative assessment, would have limited impacts upon the Cairngorms National Park designation and would not significantly affect the integrity of the designation, nor the qualities for which it has been designated.

Cairngorm Mountains NSA

7.481 The Cairngorm Mountains National Scenic Area is located 27.0 km to the south of the turbines of the Proposed Wind Farm Development, along the northern slopes of the Craiggowrie to Meall a' Bhuachaille ridge, and wholly within the National Park. The key qualities of the NSA relate to the dramatic landform of the Cairngorm mountains, the high plateau and distinctive valleys.

7.482 The visibility of the Proposed Wind Farm Development from within the NSA is limited, and over long distances. The presence of an additional group of turbines in views from the NSA would not introduce visibility of the Proposed Wind Farm Development from substantial new areas of the NSA. It is judged that the introduction of the Proposed Wind Farm Development would not significantly affect the reasons for which the NSA was designated.

7.483 In a cumulative scenario in which consented and application stage wind farms are also present in the landscape, there would be views from the hill summits NSA, of a series of wind farms in the distance to the north. The Proposed Wind Farm Development would be seen as one of this series, between Tom nan Clach and Hill of Glaschyle Wind Farms. It is judged that the cumulative impacts would not affect the reasons for which the area was designated.

Drynachan, Lochindorb and Dava Moors SLA

7.484 The Drynachan, Lochindorb and Dava Moors SLA covers an area of high moorland which separates the Cawdor-Ferness-Beachans area of Nairn district from Strathspey to the south and the route of the A9 to the west. It incorporates the continuous moors of Drynachan, Lochindorb and Dava and extends from Carn nan Tri-tighearnan in the west to Lang Hill and Carn Kitty in the east.

7.485 The key characteristics of the SLA relevant to this review are[53]:

- Rounded slopes leading to summits of relatively uniform height with a large expanse of elevated, undulating blanket bog, and moorland smooth and heather clad. Woodland cover is limited in extent and there are few buildings or structures.
- The strongly horizontal composition of elements is dominated by the sky and moorland, and a simple and prominent skyline in between. Occasional foci do exist, however, such as small craggy hills, lochans and lodges.
- Views across the undulating moorland offer wide, open horizons and broad panoramas in all directions, providing visual connectivity with the higher mountain ranges to the north, west and south
- The heather moors are defined by distinctive, geometric muirburn patterns which create an abstract mosaic of colour and texture across the slopes, and identify this as partly a manmade landscape where land management for grouse shooting is the primary activity.
- The limited network of public roads through the area, lack of habitation and other built features and open character convey a sense of remoteness and isolation. This is reinforced by the notable consistency of this character throughout its extent. There is a strong sense of tranquillity in many parts of this landscape.
- Some access tracks are cut into the slope, resulting in visible excavation and consequent erosion.
- Lochindorb stands out as the only major tract of open water in the area (largest surface body of water in East Highland plus whole of Grampian Region) and has the added interest of a ruined castle on an island in the middle. The loch has low-lying shores and is fringed with pockets of sheltered pastoral farmland, offering a pleasant contrast to the dominant surrounding moorland.

[53] From THC (2011) Assessment of Highland Special Landscape Areas

- Special qualities of the SLA include a sense of solitude, views over heather moorland, and big skies;

7.486 There are currently no existing wind farms located within this area, but Paul's Hill and Berry Burn Wind Farms are located close to the eastern boundary of this locally designated landscape and other wind farms, including Rothes Wind Farm (both phases) and Farr Wind Farm are also visible from within it. Wind farm development outside this SLA is therefore present, and visible from parts of the SLA.

7.487 The Proposed Wind Farm Development would be seen in views northwards from within this SLA, from locations within the Strathdearn Hills LCT (judged to have a minor impact) and the Open Moorlands LCT (judged to have a moderate impact within 3.5 km of the Site). The turbines would be located adjacent to the existing overhead transmission line which crosses the Site and would extend the pattern of wind farm development within the Open Moorlands LCT, yet outside the designated area, when viewed from the rounded hills and summits of the SLA.

7.488 There would be indirect impacts on the SLA area relating to the introduction of the Proposed Wind Farm Development as a feature of the landscape to the north, and increased visibility of turbines from the area would extend to parts of the SLA which have no existing visibility of wind turbines. However, it is judged that these impacts would not affect the reasons for which the area was designated.

7.489 In a cumulative scenario in which consented and application stage wind farms are also present in the landscape, the Drynachan, Lochindorb and Dava Moors SLA has Moy and Tom nan Clach Wind Farms located within it, at the western end of the area. Other wind farms are visible from the SLA to the northeast. In the presence of these wind farms, the Proposed Wind Farm Development will be seen as an additional wind farm outside the SLA to the north or northeast. It is judged that the cumulative impacts would not affect the reasons for which the area was designated.

Sutors of Cromarty, Rosemarkie and Fort George SLA

7.490 This SLA is located approximately 19 km northwest of the Site and encompasses some of the key landscape features of the Inner Moray Firth. It is an area of contrasts which forms the gateway between the open coast and expansive waters of the Moray Firth and the intimate landscapes of the Cromarty and Inverness Firths. The twin headlands at North and South Sutor which stand guard over the entrance to the Cromarty Firth are another key feature, visible from a considerable distance. There are views of existing wind farms on the hills around the SLA.

7.491 The key characteristics of the SLA focus upon the relationship of land and sea, and it is judged that the introduction of development inland at 19 km distance would not affect views around the Moray Firth and the reasons for which the area is designated.

7.492 In a cumulative scenario, there are views of several distant wind farms on the hills to the south of the Moray Firth, and the Proposed Wind Farm Development would be seen as part of, and not more prominent than, that series of wind farms. It is judged that the cumulative impacts would not affect the reasons for which the area was designated.

River Findhorn AGLV

7.493 The River Findhorn Valley is a designated local landscape, located approximately 3.5 km north of the Site at its southern end, an includes the dramatic, wooded, narrow river valley.

7.494 Given the enclosed, narrow and steep sided topography of the valley, there is limited theoretical visibility of the Proposed Wind Farm Development, which is further reduced by the wooded character of the valley. Although there are locations around the AGLV (at its periphery) with potential views of the Proposed Wind Farm Development, the character of the narrow, wooded valley would remain unaffected, and the reasons for which the area was designated would not be affected.

7.495 With the cumulative baseline, Hill of Glaschyle Wind Farm is located approximately 3 km from the AGLV, and is visible from limited locations with views east. The Proposed Wind Farm Development would form a second wind farm near the AGLV, although the character of the narrow wooded valley is would remain unaffected. It is judged that the cumulative impacts would not affect the reasons for which the area was designated.

Summary

7.496 Table: 7.11: Summary of Residual Impacts sets out the residual landscape and visual impacts predicted for the Proposed Wind Farm Development, after mitigation is complete (mitigation is largely through design).

Table: 7.11: Summary of Residual Impacts

Receptor	Residual Impact
Construction	
Site	Moderate
Decommissioning	
Site	Minor
Operational	
Landscape Receptors:	
Site	Major
Coastal Farmlands	Minor
Rolling Farmlands and Forest/ Rolling Farmland with Forest and Low Hills	Minor
Narrow Wooded Valley	Minor
Upland Moorland and Forestry	Minor
Open Uplands	Moderate within 3.5 km, Minor beyond

Table: 7.11: Summary of Residual Impacts	
Receptor	**Residual Impact**
Strathdearn Hills	Minor
Visual Receptors at Settlements:	
Ferness	Negligible
Edinkillie	Moderate
Dava	Major
Visual Receptors on Routes:	
A96 and railway	Minor
A939	Major
A940	Moderate
B9007	Minor
Lochindorb road	Minor
Aitnoch to Dulsie road	Moderate
Roads that run along the Findhorn Valley	Negligible
Road over the Darnaway Forest from Coulmony to Lethan	Negligible, but Minor if felling opens up views
General Wade's road from Dunearn to Cawdor	Minor
Dava Way	Moderate
NCN1	Minor
Visual Receptors at Viewpoints:	
Viewpoint 1: Little Aitnoch	Major
Viewpoint 2: Ferness	Negligible
Viewpoint 3 a and b: A940, above Kerrow and Knock of Braemoray	Major
Viewpoint 4: A939, West of Aitnoch	Major
Viewpoint 5: B9007, near Mount	Moderate
Viewpoint 6: Ardclach Bell Tower	Moderate
Viewpoint 7: Dava Junction	Major
Viewpoint 8: B9007, Old Military Road	Moderate
Viewpoint 9: A940, Aucheorn	Moderate
Viewpoint 10: A939 and Dava Way	Major
Viewpoint 11: Carn nan Gabhar above Lochindorb	Moderate
Viewpoint 12: Carn Kitty	Minor
Viewpoint 13: Carn Allt Laoigh	Moderate
Viewpoint 14: Mill Buie	Minor
Viewpoint 15: Carn an Uillt Bhric	Minor

Table: 7.11: Summary of Residual Impacts	
Receptor	**Residual Impact**
Viewpoint 16: Califer Viewpoint	Negligible
Viewpoint 17: Creagan a' Chaise	Minor
Cumulative impacts	
Viewpoint 3b: Knock of Braemoray (visual)	Moderate

Statement of Significance

7.497 For most commercial wind farms in the UK, having some residual significant landscape and visual effects is unavoidable. A number of significant impacts have been identified in relation to landscape and visual receptors, generally in close proximity to the Site, as set out in Table: 7.11: Summary of Residual Impacts. All significant impacts lie within 12 km of the Proposed Wind Farm Development. Mitigation measures for landscape and visual impacts are those embedded into the design of the scheme, and those relating to Site restoration during and after construction. The impacts identified are therefore residual impacts.

7.498 A number of significant impacts have been identified for landscape and visual receptors close to the Site. These arise from the introduction of the Proposed Wind Farm Development and the visual relationship it would have with the Knock of Braemoray as a landmark Hill, and Berry Burn Wind Farm further to the east. In addition, some of the views close to the Site include valued views from tourist routes, such as the A939, the Dava Way long distance walking route or designated landscapes including the Drynachan, Lochindorb and Dava Moors SLA and the edge of the Cairngorms National Park.

7.499 In the cumulative assessment, the closest wind farms to the Proposed Wind Farm Development are Hill of Glaschyle, and Berry Burn Wind Farms. The Proposed Wind Farm Development would follow the same development trend as is seen across the study area, with wind farms located in Rolling Uplands/Uplands/Open Uplands/Upland Moorland and Forestry LCTs. A significant cumulative impact is identified for the view from the summit of the Knock of Braemoray, from which this trend will be apparent.

7.500 There would be cumulative landscape and visual impacts arising from the Proposed Wind Farm Development should all of the wind farms which are considered in the cumulative assessment be present. There are varying degrees of certainty associated with likelihood of these other projects being present in the landscape, depending upon the status of each. These impacts would be the largely the same as for the LVIA, and limited additional significant cumulative impacts are identified. The main focus of the cumulative assessment is on describing the potential visual relationships between the closest wind farms to Cairn Duhie, and how the designs of each relate to one another, as seen from the various viewpoints which were examined.

8 Ecology

Introduction

8.1 This chapter of the ES has been completed by MacArthur Green Ltd. It evaluates the likely significant effects of the Proposed Wind Farm Development on the ecological resources present within the study area. Effects on birds are addressed separately in **Chapter 9: Ornithology**.

8.2 In order to determine the potential ecological impacts of the Proposed Wind Farm Development, this chapter describes: the current ecological condition of the Site and the immediate surrounding area; identifies the potential for ecological impacts and the potential for mitigation of these impacts; and, assesses the residual impacts remaining after mitigation has been implemented. This chapter considers impacts arising during the construction, operation and decommissioning phases of the Proposed Wind Farm Development. Potential secondary and indirect ecological impacts associated with off-site road improvements are described separately in **Chapter 14: Access, Traffic and Transportation**. The methodology adopted in undertaking this assessment is also described.

8.3 The Proposed Wind Farm Development is described in full within **Chapter 4: Description of Development** and **Chapter 5: Construction and Decommissioning** and illustrated within Figure 1.2: Site Boundary and Figure 4.1: Infrastructure Layout.

8.4 This chapter is supported by the following Technical Appendices:

- 8.1: Extended Phase 1 habitat survey report;
- 8.2: NVC survey results;
- 8.3: Peat Depth Survey and Information to Inform an Assessment of Blanket Mire Condition;
- 8.4: Protected species surveys report;
- 8.5: Bat survey report;
- 8.6: Fisheries survey report; and
- 8.7: Outline Habitat Management Plan

Legislation and Policy Context

International Legislation and Policy

EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna, 92/43/EEC, 1992 ("Habitats Directive")

8.5 The EC Habitats Directive promotes the maintenance of biodiversity in Europe. The Directive provides for the creation of a network of protected areas across the continent, designated by Member States as Special Areas of Conservation (SACs). Together with Special Protection Areas (SPAs) designated under the EC Birds Directive (see **Chapter 9: Ornithology**), SACs form a network of pan-European protected areas known as Natura 2000. The annexes to the Directive list habitats and species of importance in a European-wide context. Annex I of the Directive comprises a list of 189 habitat types for which Member States must consider designation for SACs. A sub-set of the Annex I habitat types are defined as behind 'priority' because they are considered to be particularly vulnerable and are mainly, or exclusively, found within the European Union. Annex II of the Directive comprises a list of species for which Member States must consider designation for SACs. Member States are required to ensure strict protection of species listed in Annex IV.

EC Directive Establishing a Framework for the Community Action in the Field of Water Policy, 2000/60/EC ("Water Framework Directive")

8.6 The Water Framework Directive requires all Member States to have achieved 'good status' for all surface and ground water bodies by 2015. The Directive encourages co-operation between Member States by requiring management at a 'River Basin' level, many of which cross national boundaries.

The Fresh Water Fish Directive and its Transposition into National Law

8.7 The Water Environment (Register of Protected Areas) (Scotland) Regulations 2004 includes water bodies designated under the Fresh Water Fish Directive (78/659/EEC). The purpose of the Fresh Water Fish Directive is to protect or improve the quality of running or standing fresh waters which support or may become capable of supporting fish life. The WFD's overall objective is to bring about the effective co-ordination of water environment policy and regulation across Europe, and eventually the Freshwater Fish Directive will be repealed by this legislation[1].

National Legislation and Policy

The Wildlife and Countryside Act 1981 (As Amended)

8.8 The Wildlife and Countryside Act is the primary legislation for the protection of wildlife in Great Britain. The act provides for the designation of protected areas through the designation of Sites of Special Scientific Interest (SSSI), which are selected for their nationally important assemblages of habitats, species and geological interest. The act provides additional protection for certain plants and animals, including water vole *Arvicola terrestris* and red squirrel *Sciurus vulgaris*.

8.9 The following national legislation, policy and guidance are considered as part of the assessment.

The Water Environment and Water Services (Scotland) Act 2003 (WEWS)

8.10 The WEWS transposes the Water Framework Directive into Scottish law.

[1] SEPA and Freshwater fisheries (http://www.sepa.org.uk/water/protected_areas/freshwater_fisheries.aspx)

Nature Conservation (Scotland) Act 2004 (as amended);

8.11 This act places duties on public bodies in relation to the conservation of biodiversity and strengthens protection for SSSIs and wildlife enforcement. The Act places a duty on every public body to further the conservation of biodiversity in a consistent manner with the proper exercise of their functions.

The Wildlife and Natural Environment (Scotland) Act 2011

8.12 This act makes amendments to the laws governing deer management, game and snaring and also updated badger licensing as well as seeking to improve licensing administration in general.

The Protection of Badgers Act 1992

8.13 This Act provides protection for badgers *Meles meles* and their habitats. It makes it an offence to wilfully take, kill, injure or ill-treat a badger; to obstruct, destroy or damage badger sett or to disturb badgers whilst they are in a sett.

The UK Biodiversity Action Plan (UKBAP) 1994

8.14 The UK BAP, produced in 1994 by the Government, is a national strategy for the conservation of biodiversity. It is the UK Government's response to the Convention on Biological Diversity (CBD) signed in 1992. The Convention called for the development and enforcement of national strategies and associated action plans to identify, conserve and protect existing biological diversity, and to enhance it wherever possible. Action plans for the most threatened species and habitats have been set out to aid recovery, and achieve the significant reduction in biodiversity loss called for by the CBD.

The Conservation (Natural Habitats &c.) Regulations 1994 (As Amended) (The Habitats Regulations)

8.15 These regulations transpose Council Directive 92/43/EEC into national law. The Regulations provide for the designation of Natura 2000 sites, the protection of European Protected Species (EPS), and the adaptation of planning and other controls for the protection of Natura 2000 sites.

Regional and Local Policy

8.16 The following regional and local policy and guidance are considered as part of the assessment.

North East Scotland Local Biodiversity Action Plan 2000

8.17 This document details the habitats and species deemed as important at a local level and receiving dedicated plans for their conservation as a result. The Plan also implements conservation required under the UKBAP where relevant.

Highland-wide Local Development Plan (2012)

8.18 This Plan details the specific planning policies that have been produced to guide and assess development within the Local Authority area. Those particular policies relevant to this chapter are as follows:

- Policy 28 – Sustainable Design;
- Policy 51 – Trees and Development;
- Policy 55 – Peat and Soils;
- Policy 57 – Natural, Built and Cultural Heritage;
- Policy 58 – Protected Species;
- Policy 59 – Other Important Species;
- Policy 60 – Other Important Habitats;
- Policy 63 – Water Environment; and
- Policy 67 – Renewable Energy

Moray Local Plan (2008)

8.19 The Moray Local Plan 2008 interprets the strategic land use planning guidance provided by the Moray Structure Plan 2007 and presents detailed policies and proposals to guide and assess development proposals. Those particular policies relevant to this chapter are as follows:

- E1: Natura 2000 Sites and National Nature Conservation Sites;
- E2: Local Nature Conservation Sites and Biodiversity; and
- BE4: Gardens and Designed Landscapes.

Issues Identified During Consultation

8.20 Table 8.1 summarises the consultation responses received with regard to ecology and provides information on where and how they have been addressed in the assessment.

Table 8.1 Issues Identified During Consultation

Consultee	Issue	Where/How this is addressed
Association of Salmon Fishery Board	Suggest consulting with Findhorn, Nairn and Lossie Fisheries Trust	FNLFT commissioned to undertake fisheries survey and produce relevant technical reporting included as **Technical Appendix 8.6**. FNLFT consulted on the scoping report.
	Guidelines on assessing potential impacts on migratory fish species and the fisheries they support, as set by ASFB, should be fully considered throughout the planning, construction and monitoring phases of the proposed development.	Addressed in 'Potential Impacts' and 'Residual Impacts' sections, covering all phases of development.

Table 8.1 Issues Identified During Consultation

Consultee	Issue	Where/How this is addressed
Cairngorms National Park Authority (CNPA)	The potential for ecological impacts upon the Park should be fully considered and reported on.	The Cairngorms National Park (CNP) is situated over 7 km south of the Site. Given the geographical range of species identified in this Chapter (maximum 2 km for otter) and considering that the Site is hydrologically disconnected from the CNP; it is considered that the CNP will not be affected by the Wind Farm Development.
Findhorn District Salmon Fishery Board	No response received	Not applicable
Findhorn, Nairn & Lossie Fishery Trust	No response received	Not applicable
The Highland Council	Identify rare and threatened habitats and consider sites designated for nature conservation	Addressed from paragraph 8.43 onwards.
	The ES should address likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development.	Addressed in 'Potential Impacts' and 'Residual Impacts' sections, covering all phases of development.
Marine Scotland	Request that fish of conservation importance are surveyed in order to form an adequate baseline	Addressed within Technical Appendix 8.6.
Scottish Natural Heritage	Consideration of designated sites to 20 km within the assessment.	Identified within paragraph 8.43. Designated Sites within 5 km of the Site are considered in this Chapter (designated Sites within 20 km are considered in **Chapter 9 Ornithology**). Given the geographical range of species identified in this Chapter (maximum 2 km for otter) and considering that **Chapter 11 Geology, Hydrology and Hydrogeology** consider no hydrological impacts to designated sites over 5 km downstream of the Site, only designated sites within 5 km are considered in this Chapter.
	Further detail required on nature of wildcat and pine marten surveys.	Addressed within Technical Appendix 8.4
	All protected species surveys to be undertaken using standard methodologies.	Addressed within Technical Appendix 8.4.
	Habitat surveys to extend to both Phase 1 and NVC.	Addressed within Technical Appendices 8.1 and 8.2.
	Due consideration to be given to fisheries and aquatic invertebrates, including freshwater pearl mussel surveys where deemed necessary.	Addressed within Technical Appendices 8.4 and 8.6 and Paragraph 8.107.

Assessment Methodology

Baseline Characterisation

Study Area

8.21 The Study Area refers to the area within which surveys were undertaken and varies between certain survey methods (e.g. otter surveys extend outwith the Site by a distance of 250 m upstream and downstream where appropriate), and each study area is detailed within the relevant Technical Appendices.

Desk Study

8.22 A desk study was undertaken to collate available ecological information in relation to the Site. This comprised a thorough search of available online datasets as provided by SNH and the National Biodiversity Network (NBN) Gateway. The desk study searched for records within 5 km of the Site boundary; the results are summarised in the 'Baseline Conditions' section of this chapter and are illustrated within Figure 8.6. Designated Sites within 5 km of the Site are considered in this chapter (designated sites within 20 km are considered in **Chapter 9 Ornithology**). Given the geographical range of species identified in this chapter (e.g. maximum 2 km for otter) and given that **Chapter 11 Geology, Hydrology and Hydrogeology** predicts hydrological impacts to designated sites over 5 km downstream of the Site, only designated sites within 5 km are considered in this chapter.

Field Surveys

8.23 The following field surveys were undertaken to establish the baseline ecological conditions in the study area, and were undertaken in line with standard methodologies and guidance (areas covered in brackets):

- Extended Phase 1 habitat survey (across the Site);
- National Vegetation Classification (NVC) survey (across the Site);
- Peat / Blanket Mire Assessment (across the Site);
- Badger survey (across the Site and immediately outwith the Site where suitable habitat exists – surveyor discretion);
- Bat habitat assessment and activity survey (targeted survey across the Site; tree survey across the Site and affected areas along the access route);
- Otter survey (across the Site and 250 m upstream and downstream of the Site);
- Water vole survey (across the Site and 250 m upstream and downstream of the Site); and
- Fisheries assessment (across the Site and within the wider catchment downstream of the Site).

8.24 Field surveys were undertaken during 2011 and 2012. The full suite of survey methods and results is provided within **Technical Appendices 8.1 – 8.7**.

8.25 The guidance documents consulted to inform the above surveys are as follows:

- IEEM Guidelines for ecological impact assessment in the UK (2006);

- Bat Conservation Trust (2010) Bat Surveys – Good Practice Guidelines 2nd Edition: Surveying for Onshore Windfarms;
- Joint Nature Conservation Committee, 1990. Handbook for phase 1 habitat survey – a technique for environmental audit. Revised reprint 2003. JNCC;
- Natural England (2009) Natural England Technical Information Note TIN 051. Bats and Onshore Wind turbines – Interim Guidance;
- Reynolds, P. and Harris, M. (2005). Inverness Badger Survey 2003. Scottish Natural Heritage
- Commissioned Report No. 096 (ROAME No. F02LE01);
- Rose, F. (1981). A Wild Flower Key, for the British Isles and North West Europe. Revised reprint 2006. Warne, London;
- Sargent, G. and Morris, P. (2003) How to Find and Identify Mammals. The Mammal Society, London.
- Scottish Renewables, SNH, SEPA, FC (Scotland) (2010, Version 1) Good Practice During Windfarm Construction; and
- Stace, C., 1997. New Flora of the British Isles (2nd Edition), Cambridge University Press. Strachan, R. and Moorhouse, T. (2006) The Water Vole Conservation Handbook. Second Edition, Wildlife Conservation Research Unit, Department of Zoology, University of Oxford.

Method of Assessment

8.26 The assessment method follows the process set out in the Electricity Works (EIA) (Scotland) Regulations 2000 and guidance on the implementation of the EU Birds and Habitats Directive[2].

8.27 Further guidance used during the assessment process is as follows:

- Nature Conservancy Council. (1989). Guidelines for selection of biological SSSIs;
- IEEM. (2006). Guidelines for ecological impact assessment in the UK;
- Bat Conservation Trust. (2010) Bat Surveys – Good Practice Guidelines 2nd Edition: Surveying for Onshore Windfarms;
- Scottish Executive. (1999). Policy Advice Note 1/2013 - Environmental Impact Assessment;
- Scottish Executive. (2011). Planning Circular 3;
- Natural England (2009) Natural England Technical Information Note TIN 051. Bats and Onshore Wind turbines – Interim Guidance;
- Scottish Environment Protection Agency (SEPA) (2011) Guidance Note 4 - Planning Advice on Windfarm Developments;
- Scottish Renewables, SNH, SEPA, FC (Scotland) (2010, Version 1) Good Practice During Windfarm Construction;
- Scottish Natural Heritage, Scottish Environmental Protection Agency, Scottish Government and The James Hutton Institute (2011) Guidance: Development on Peatlands: Site Surveys;
- Scottish Natural Heritage (2012) Assessing the cumulative impact of onshore wind energy developments; and
- Scottish Government (2001) Calculating Potential Carbon Losses & Savings from Wind Farms on Scottish Peatlands. Windfarms and Carbon savings on peatlands. Technical Note – Version 2.0.1.

8.28 The evaluation for wider countryside interests (i.e. all those receptors unrelated to any Natura 2000 sites) involves the following process:

- identification of the potential effects of the Proposed Wind Farm Development;
- consideration of the likelihood of occurrence of potential effects where appropriate;
- defining the Nature Conservation Value of the ecological receptors present;
- establishing the receptor's Conservation Status where appropriate; and
- establishing the Magnitude of the likely effect (both spatial and temporal).

8.29 Based on the above information, a professional judgment as to whether or not the identified effect is Significant with respect to the EIA Regulations will be made as follows;

- if a potential effect is determined to be significant, measures to mitigate or compensate the effect are suggested where required;
- opportunities for enhancement are considered; and
- residual effects after mitigation, compensation or enhancement are considered.

Determining Nature Conservation Value

8.30 Value is defined on the basis of the geographic scale given in Table 8.2 (which follows the guidance as detailed within IEEM 2006[3]). Attributing a value to a receptor is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of a value level. For example, a Special Area of Conservation (SAC) designated under the Habitats Directive is implicitly of European (International) importance. In the case of species, assigning value is less straightforward as 'it is necessary to consider its distribution and status, including a consideration of trends based on available historical records'[2]. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population on site may be quite different (e.g. the site population may consist of a single transitory animal, which within the context of a thriving local/regional/national population of a species, is clearly of local or regional value rather than national or international).

[2] SERAD (Scottish Executive Rural Affairs Department) 2000. Habitats and Birds Directives, Nature Conservation: Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('The Habitats and Birds Directives'). Revised Guidance Updating Scottish Office Circular No 6/1995.

[3] IEEM (2006) Guidelines for ecological impact assessment in the UK

8.31 Where possible, the valuation of habitat/populations within this assessment will make use of any relevant published evaluation criteria (e.g. Nature Conservancy Council guidance on selection of biological SSSIs).

8.32 Those ecological receptors affected at the Site and deemed to be of local, regional, national and international importance are termed 'Valued Ecological Receptors'.

8.33 Where relevant, information regarding the particular receptor's conservation status shall also be considered in order to fully define its value. This will enable an appreciation of current population or habitat trends to be incorporated into the assessment.

Table 8.2 Approach to valuing ecological receptors

Value of Receptor	Description
International	An internationally designated site (e.g. SAC), Site meeting criteria for international designations.
	Species present in internationally important numbers (>1% of biogeographic populations).
National	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation.
	Species present in nationally important numbers (>1% UK population).
	Large areas of priority habitat listed on Annex I of the EC Habitats Directive and smaller areas of such habitat that are essential to maintain the viability of that ecological resource.
Regional (Natural Heritage Zone or Local Authority Area)	Species present in regionally important numbers (>1% of Natural Heritage Zone population).
	Sites falling below criteria for selection as a SSSI (e.g. areas of semi-natural ancient woodland larger than 0.25 ha).
Local	Local Nature Reserves (LNR).
	Areas of semi-natural ancient woodland smaller than 0.25 ha.
	Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species. Receptors falling below local value are not normally considered in detail in the assessment process.

8.34 The following sections further define the methods used to evaluate magnitude of likely effects and Nature Conservation Value.

Method Used to Evaluate the Magnitude of Likely Effects

8.35 Effect magnitude refers to changes in the extent and integrity of an ecological receptor. The only definition of ecological 'integrity' is found within circular 6/1995 (2000) which states that 'The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified'. Although this definition is used specifically regarding European level designated sites (SACs and SPAs), it is applied to wider countryside habitats and species for the purposes of this assessment.

8.36 Determining the magnitude of any likely effects requires an understanding of how the ecological receptors are likely to respond to the Proposed Wind Farm Development. This change can occur during construction, operation or after the decommissioning of the Proposed Wind Farm Development.

8.37 Effects can be adverse, neutral or beneficial.

8.38 Effects are judged in terms of magnitude in space and time. There are five levels of spatial effects and four levels of temporal effects as described in Tables 8.3 and 8.4.

Table 8.3 Definition of Spatial Effect Magnitude upon the VERs

Spatial Magnitude	Definition
Very High	Would cause the loss of the majority of a receptor (>80%), or would be sufficient to damage a receptor sufficient to immediately affect its viability.
High	Would have a major effect on the receptor, sufficient to result in short-term losses and impacts upon its long-term viability. For example, more than 20% habitat loss or damage.
Moderate	Would affect the receptor in the short and medium-term, but should not alter its long-term viability. For example, between 10 - 20% habitat loss or damage.
Low	Would have a minor effect upon the receptor, either of sufficiently small-scale or of short duration to cause no long-term harm. For example, less than 10% habitat loss or damage.
Negligible	Minimal change on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.

Table 8.4 Temporal Effect Magnitude

Temporal Magnitude	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as 26+ years), except where there is likely to be substantial improvement after this period in which case the category Long Term may be more appropriate.
Long term	Between 15 years up to (and including) 25 years.
Medium term	Between 5 years up to (but not including) 15 years.
Short term	Up to (but not including) 5 years.
Negligible	No effect.

Significance Criteria

8.39 The significance of potential effects is determined by integrating the assessments of Nature Conservation Value, Conservation Status and magnitude in a reasoned way.

8.40 Table 8.5 details the significance criteria that have been used in assessing the effects of the Proposed Wind Farm Development:

Table 8.5 Significance Criteria

Significance Level	Definition
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the integrity of the receptor.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the receptor.
Minor	The effect is likely to adversely affect the receptor at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. This is not a significant effect.
Negligible	No material effect. This is not a significant effect.

8.41 Using these definitions, it must be decided whether there will be any effects which will be sufficient to adversely affect the Valued Ecological Receptor to the extent that its Conservation Status deteriorates above and beyond that which would be expected should baseline conditions remain (i.e. the 'do nothing' scenario).

Cumulative Assessment

8.42 Cumulative effects are not possible to evaluate through the study of one development in isolation, but require the assessment of effects when considered in combination with other developments. The context in which these effects are considered is heavily dependent on the ecology of the receptor assessed. For example, for water voles it may be appropriate to consider effects specific to individual catchments, should the distance between neighbouring catchments be sufficient to assume no movement of animals between them. Therefore an assessment of cumulative impacts will be made for each receptor, appropriate to its ecology.

Limitations

8.43 Limitations exist with regard to the knowledge base on how some species, and the populations to which they belong, react to effects. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

8.44 There were no limitations experienced with regards weather conditions during and preceding surveying, with all survey work undertaken during appropriate conditions and seasons.

8.45 It should be noted that the layout of the turbines, and hence tracks and cables, would be subject to 50 m micrositing. The assessment of impacts presented within this chapter has been based upon the layout defined in **Chapter 4: Description of Development**. Any micrositing changes would respect the exclusion zones defined within this chapter such that no infrastructure would be moved to the extent that impacts would be any greater than those reported in this chapter.

Baseline Conditions

Designated Sites

8.46 No designated sites are present within the Site. The following designated sites are present within 5 km of the boundary of the Proposed Wind Farm Development (sites designated for their ecological importance only (refer to Figure 8.6); designations relating to ornithology are considered in Chapter 9):

- Moidach More SSSI/SAC– designated for its blanket bog habitat. Located approximately 3 km to the east of the site.
- Lower Findhorn Woods SSSI/SAC – designated for its mixed woodland, bryophytes and Oligotrophic running water. Located approximately 3 km to the north of the Site.

Site Description

8.47 The Site comprises typical upland habitats, with a peat-based substrate vegetated with a mixture of heath and bog dominating. Plantation forestry is present to the north of the Site, with an oligotrophic loch present to the immediate south. Topographically, the Site rises from all sides towards the peak of Cairn Duhie in the central portion of the Site. There are several minor watercourses on the Site which sit within the River Findhorn catchment.

8.48 The Site is managed at a fairly low level for grazing, localised peat-cutting and burning. Evidence of more substantial management is present in the forms of systematic drainage channels.

Field Surveys

8.49 Details regarding field survey methodologies and results are included within **Technical Appendices 8.1 - 8.7**. The following section summarises the baseline conditions as identified during these surveys.

Habitat Description – Phase 1 and NVC Habitat Surveys

8.50 A Phase 1 habitat survey was undertaken during July 2011 and identified the following habitat types and extents.

Table 8.6 Habitat Types by Area

Habitat Type	Area (ha)
Wet Modified Bog	362.0
Wet Dwarf Shrub Heath	147.17
Dry Dwarf Shrub Heath	51.1
Blanket Bog	35.3
Acid Grassland (Semi-improved)	31.7
Coniferous Plantation	11.7
Wet Heath/Acid Grassland Mosaic	7.3

Table 8.6 Habitat Types by Area	
Habitat Type	**Area (ha)**
Broadleaved Woodland – Semi-Natural	2.8
Fen (including Valley Mire)	14.0
Acid/Neutral Flush	0.09
TOTAL	663.09 ha[4]

8.51 NVC surveys were completed in June 2012. Surveys followed standard Joint Nature Conservation Committee (JNCC) methods (as detailed within **Technical Appendix 8.2**) and resulted in the following communities being recorded from the Site as detailed below (also refer to Figures 8.2a and 8.2b). It should be noted that NVC community representation across the Site is often within the context of a mosaic habitat and that, although the following habitats were recorded, this does not necessarily translate to dominance within a particular stand.

- H10 - Calluna vulgaris – Erica cinerea heath
- H12 - Calluna vulgaris – Vaccinium myrtillus heath
- M2 - Sphagnum cuspidatum/recurvum bog pool community
- M3 - *Eriophorum angustifolium* bog pool community
- M4 - Carex rostrata – Sphagnum recurvum mire
- M6 - Carex echinata – Sphagnum recurvum/auriculatum mire
- M10 - Carex dioica – Pinguicula vulgaris mire
- M15 - Scirpus cespitosus – Erica tetralix wet heath
- M17 - Scirpus cespitosus – Eriophorum vaginatum blanket mire
- M19 - Calluna vulgaris – Eriophorum vaginatum blanket mire
- M20 - Eriophorum vaginatum blanket mire
- M23 - Juncus effusus/acutiflorus – Galium palustre rush-pasture
- M25 - Molinia caerulea – Potentilla erecta mire
- U4 - Festuca ovina – Agrostis capillaris – Galium saxatile grassland
- U6 - Juncus squarrosus – Festuca ovina grassland
- W4 - Betula pubesce*ns* – *Molinia caerulea* woodland

8.52 These results were then referenced against SEPA guidance (2011)[5] in order to identify those habitats classified as being groundwater dependent (Ground Water Dependent Terrestrial Ecosystems – GWDTE). From the guidance, the following GWDTEs were confirmed as being present on the Site (includes those classified by SEPA as being moderately and highly groundwater dependent):

- M6 - Carex echinata – Sphagnum recurvum/auriculatum mire
- M10 - Carex dioica – Pinguicula vulgaris mire
- M15 - Scirpus cespitosus – Erica tetralix wet heath
- M23 - Juncus effusus/acutiflorus – Galium palustre rush-pasture
- M25 - Molinia caerulea – Potentilla erecta mire
- U6 - Juncus squarrosus – Festuca ovina grassland
- W4 - Betula pubescens – Molinia caerulea woodland

8.53 An assessment of effects upon a GWDTE community is considered only where a GWDTE was considered to be a dominant/important factor in that community's hydrological structure and function (i.e. where habitat mosaics contain remnants of GWDTE habitats that aren't considered to be fully groundwater dependent, these areas are discounted from further assessment in a GWDTE context). This approach is accepted practice by SEPA. This is considered in more detail **in Chapter 11 – Geology, Hydrology and Hydrogeology**.

Habitat Descriptions

8.54 The following habitat descriptions are illustrated in Figure 8.1: Extended Phase 1 survey results 2011 and within **Technical Appendix 8.1**.

8.55 Peat-based habitats dominate the Site, with wet modified bog occupying approximately 55% by area. The dominance of this habitat is only broken up to any significant extent by heath-dominated habitats upon the slopes and summit of Cairn Duhie, and heath and improved grassland habitats in the far northwest of the Site. The habitat varies in species composition across the Site and is defined more by the absence of key bog species such as *Sphagnum papillosum* and *S. magellanicum*. Hare's-tail cottongrass *Eriophorum vaginatum* is present throughout, to varying extents, with heather *Calluna vulgaris* representing the most common associate. The habitat shows signs of degradation in many areas, and has dried out to varying extents as a result of systematic drainage (especially evident in the south of the site), grazing, burning and localised cutting (see **Technical Appendix 8.3** for more detailed information in this regard). The habitat is also likely to be suffering from ongoing desiccation as a result of tree encroachment at various points. The predominant NVC type within this habitat type is M19, although M20 mire is also scattered across the Site and more indicative of a degraded habitat. M25 communities are also present within this habitat.

8.56 **Blanket bog** is localised in its distribution across six separate areas, all located in the northern half of the Site. The habitat covers a total area of 17.1 ha and is found often in association with wet modified bog habitats. The defining feature of the habitat on the site is the presence of *Sphagnum papillosum*, which forms extensive carpets in some areas, most notably within the habitat in the far northeast of the Site. There is a notable reduction in shrub presence when compared with the wet modified bog habitat described above, with heather markedly reduced in extent. Hare's-tail cottongrass is dominant, with common cottongrass *Eriophorum angustifolium* also present in places. Round-leaved sundew *Drosera rotundifolia*, bilberry *Vaccinium myrtillus* and bog asphodel *Narthecium ossifragum* are

[4] Discrepancy between this total and the total site area (666 ha) is caused by liner features, such as watercourses etc. not being included in this total area.

[5] SEPA (2011). Guidance Note 4 - Planning Advice on Windfarm Developments.

locally present, whilst sedge presence is limited to occasional few-flowered sedge *Carex paucitflora*. Blanket bog habitat on the Site comprises only the M17 NVC community.

8.57 **Wet dwarf shrub heath** is the second most abundant habitat on the Site, extending across much of the slopes of Cairn Duhie and across the far northwest of the Site. The species composition is typically similar to the bog habitats described above but with a greater abundance of deergrass *Trichophorum cespitosum* and much-reduced hare's-tail cottongrass presence. Cross-leaved heath *Erica tetralix* is frequent and occasionally achieves co-dominance with deergrass. Similarly, purple moor grass *Molinia caerulea*, and common cottongrass *Eriophorum angustifolium* are co-dominant in places. The habitat comprises M15 NVC community only, with both M15b and M15c sub-communities represented.

8.58 Variations in soil chemistry and hydrology within the overall wet heath habitat are indicated by local abundances of more base-tolerant vegetation such as butterwort *Pinguicula vulgaris*, common *twayblade Neottia* ovate, carnation sedge *Carex panicea* and *Sphagnum denitculatum*. In these areas, the M15a NVC sub-community is dominant.

8.59 In places, this habitat forms a mosaic with acid grassland communities. In these areas, grass species comprise an increasingly dominant factor, with wavy hair grass *Deschampsia flexuosa* and Yorkshire fog *Holcus lanatus* frequent components herein.

8.60 **Dry dwarf shrub heath** habitat is dominant on the upper southern slopes of Cairn Duhie, with additional pockets on the lower slopes and close to the western Site boundary in the north of the Site. The habitat is typically dominated by heather, in places to the preclusion of all other higher plant presence. In places, a relatively diverse shrub layer is present, with bilberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum*, bearberry *Arctostaphylos Uva-Ursi* and cowberry *Vaccinium vitis-idaea* all recorded. This habitat exhibits evidence of degradation around the western slopes of Cairn Duhie where cutting and burning has occurred. Bryophytes are notably hypnoid moss-dominated although pockets of *Sphagnum capillifolium* are also present. The NVC types within this habitat are H10 and H12.

8.61 **Woodland** presence on the Site is restricted to four distinct areas. Two small patches of **semi-natural broadleaved woodland** are present along the western boundary of the Site and are typical of the broadleaved habitat in the wider area with a dominance of downy birch *Betula pubescens* over a grass-dominated ground flora. The habitat is classified as W4 NVC type. Elsewhere, similar species composition achieves a fragmented presence, especially alongside surface water movement in the more central parts of the Site. At these locations, the underlying habitat is overriding in terms of classification.

8.62 The only other areas of woodland comprises a small rectangle of **coniferous plantation** in the northwest of the site, and a small stand which flanks the transmission line in the northeast of the Site, both of which are exclusively Scots pine *Pinus sylvestris*-dominated. Scots pine presence across the Site is greater than this suggests, with self-seeded remnants of a previously more continuous habitat evidenced in a scattered presence, especially along the eastern boundary of the Site.

8.63 **Grassland** habitat on the Site is restricted to patches of **semi-improved acid grassland** in the north of the Site where a grazing regime prevails and maintains a greatly reduced sward length over a habitat lacking in species diversity. Constant species within this habitat are typical for the community, with Yorkshire fog, sweet vernal grass *Anthoxanthum odoratum* and sheep's fescue *Festuca ovina*. The extents of this habitat are often defined by field boundaries and the subsequent extent of grazing pressure. NVC communities U4 and U6 are present here.

8.64 **Fen** habitats on the site are characteristically associated with water movement and often form distinct components of a watercourse floodplain. The habitat varies markedly with regard the species composition and diversity. The most dominant fen habitats are classified as M6 NVC type and are soft rush *Juncus effusus*-dominated, with restricted higher plant associates and a bryophyte layer dominated by *Sphagnum fallax* and *S. palustre*. This fen type is frequent alongside the running water on the site.

8.65 Greater species diversity within the fen habitat is found at several points across the Site where soft rush is much reduced or absent, seemingly replaced by a sedge community including abundant common sedge *Carex nigra* and more scattered bottle sedge *C. rostrata*, star sedge *C. echinata*, white sedge *C. curta* and remote sedge *C. remota*. Herb species also form a more important component of the habitat, with marsh thistle *Cirsium palustre*, fen bedstraw *Galium uliginosum*, marsh willowherb *Epilobium palustre*, cuckoo flower *Cardamine pratensis*, creeping buttercup *Ranunculus repens*, and lesser spearwort *R. flammula* all present to varying extents. This habitat comprises the M23 NVC community.

8.66 A single pocket of poor **Acid/neutral flush** habitat is present in the southeast of the Site adjacent to the site boundary. This habitat is similar to the fen habitats described above being dominated by common sedge over a *Sphagnum fallax* carpet (NVC M6), and differs only in its reflection of localised water movement.

8.67 **Running water** on the Site is restricted to three minor tributaries within the River Findhorn catchment. The Burn of Lochan Tutach bisects the southern section of the Site, feeding the Dorback Burn approximately 1.5 km east of the Site. The Stripe of Muckle Lyne and the Stripe of Little Lyne drain the northern extents of the site. All of these watercourses show relatively high levels of occlusion and are in places vegetated to 100% coverage by a variety of plant species including bog myrtle *Myrica gale* (the western extents of Burn of Lochan Tutach on the site) and fen vegetation (more prevalent in the north of the Site). The watercourses share relatively similar morphological characteristics, with maximum widths of <1 m and depths to 0.5 m. With the exception of the most northerly extents where mineral soils are more prevalent and reflected in the channel composition here, the substrate is generally peat-based.

Peat Depth and Mire Condition Assessment

8.68 The Site was subject to peat survey and blanket mire condition assessment (across a 100 m systematic grid, and then a higher resolution 50 m grid around all Site infrastructure

following design freeze – see **Technical Appendix 8.3**). The survey had the following aims and objectives:

- **Aim 1: Gather high resolution peat depth data on a 100 m2 systematic** grid.
  - Objective 1.1: Inform the layout of the Proposed Wind Farm Development's infrastructure to help reduce impacts associated with blanket mire habitats.
  - Objective 1.2: Provide peat depth data to inform the impact of the Proposed Wind Farm Development on carbon losses arising from disturbance to peat based habitats.
- Aim 2: Determine blanket mire condition across the site.
  - Objective 2.1: Inform the EIA on the condition of the blanket mire.

8.69 The results of this study are included here in order to provide additional information where relevant (e.g. to corroborate the nature and extent of key bog plant species presence etc.)

8.70 The deepest peat across the Site was recorded from a section of wet modified bog habitat in the southeast of the Site, where peat in excess of 5 m is present (see **Technical Appendix 8.3**, Figure 2 for the peat depth survey coverage).

8.71 The only additional occurrence of peat in excess of 4 m depth is found in the northeast of the Site where the substrate reaches 4.1 m.

8.72 The majority of the Site sits on peaty soil which is of less than 0.5 m depth, with relatively isolated 'islands' of deeper peat (to ca. 3.5 m max.) occurring on the western and northern slopes of Cairn Duhie.

8.73 The two deeper areas of peat (see **Technical Appendix 8.3**, Figure 2) are likely to represent the outer extents of larger mire units which prevail outwith the Site boundary. Aside from this potential association, there are no mire macrotopes of note that were identified on the Site.

8.74 The mire condition study also utilised information regarding dominant vegetation and Sphagnum abundance, and signs of anthropogenic influence to gauge the current status of the habitat across the Site.

8.75 In general, the mire habitats across the Site were seen to be relatively degraded, although seemingly still quite active in most parts, with key *Sphagnum* species such as *S. papillosum* and/or *S. magellanicum* widely (albeit infrequently) scattered in their distribution (the former occurring at 50 of 692 sampling points; the latter only occurring at one point). Furthermore, hare's-tail cottongrass was seen to be abundant across the Site. The presence of the *Sphagnum* species shows a marked correlation with the areas of deeper peat, and those areas classified as 'bog' (either wet modified bog or blanket bog in Phase 1 terms), as is to be expected given their reliance on wet, ombrotrophic conditions.

8.76 Overall Sphagnum coverage is fairly high, with presence recorded at 439 (ca. 63%) of all sample points. Aside from the aforementioned bog species, the remaining *Sphagnum* coverage comprises (in descending order of coverage) *S. capillifolium*, *S. palustre*, *S. fallax*, *S. cuspidatum* and *S. tenellum*, which reflect the heath-dominated nature of much of the remaining Site.

8.77 Although still relatively active, and comprising important bog species in some areas, it is considered that the bog habitats have suffered mainly from historical and prolonged drainage, which has resulted in a lowered water table across the whole Site. Additional negative influences upon the bog habitat here include localised burning and grazing.

8.78 More information on peat depths is presented in **Chapter 11: Geology, Hydrology and Hydrogeology**.

Protected Species Surveys

Badger

8.79 Full details pertaining to the legal status of badgers are included within **Technical Appendix 8.4**.

8.80 No records of badger presence within the vicinity of the Site were obtained during a search of online data sets.

8.81 No signs of active badger presence were recorded during field surveys across the Site or within land immediately adjacent, although two burrow complexes were identified which, whilst not in current use by the species, may have been historically occupied, or if in use, only periodically used as outlier setts (see Confidential Figure 1). Much of the Site is considered unsuitable for the species due to the general wetness of the peat-dominated substrate. More suitable foraging areas were identified within the more improved parts of the Site (e.g. within the semi-improved grassland habitats in the north).

Bats

8.82 Full details pertaining to the legal status of bats are included within **Technical Appendix 8.5**. Bat survey locations are detailed in Figure 8.3.

8.83 No records of bat presence within the vicinity of the Site were obtained during a search of online data sets.

8.84 A total of three bat species were recorded during surveying as follows:

- Common pipistrelle Pipistrellus pipistrellus
- Soprano pipistrelle *P. pygmaeus*
- Daubenton's Bat Myotis daubentonii

8.85 In addition, records of an unidentified pipistrelle and *Myotis* sp. bat were also made.

8.86 No bat roosts were identified during surveying.

8.87 The most exhaustive data was obtained from the Anabat survey (see **Technical Appendix 8.5**), and revealed that bat activity across the Site is low, with a maximum average of 3.1 passes per hour recorded from the four Anabat locations. In total, 1435 bat passes were recorded from 1134.17 hours of static surveying. The maximum average was obtained from a location close to an edge feature (woodland edge), whilst the lowest average (0.3) was obtained from a detector located adjacent to a minor watercourse. Aside from the detector

located adjacent to the woodland, none of the detectors recorded bat activity of greater than 0.86 passes per hour.

8.88 The vast majority of all the bat passes recorded were soprano pipistrelle (879 passes in total), with common pipistrelle (382 passes) the second most abundant.

8.89 Daubenton's bat was recorded at very low levels (174 passes across the static detector surveys at an average of 0.15 passes per hour).

8.90 The walked transects revealed a similar picture, albeit with common pipistrelle the most abundant record (49 passes from 53.48 hours of survey). The pattern of peak activity around edge features remained constant, with the roadside point counts resulting in the highest average passes figure of 3.15 passes per hour.

Otter

8.91 Full details pertaining to the legal status of otters are included within **Technical Appendix 8.4**.

8.92 No records of otter presence within the vicinity of the Site were obtained during a search of online data sets.

8.93 No signs of otter presence were recorded from the Site during surveying, with the habitat here considered to be sub-optimal mainly by virtue of the limited extent of the watercourses present.

Water vole

8.94 Full details pertaining to the legal status of water voles are included within **Technical Appendix 8.4**.

8.95 No records of water vole presence within the vicinity of the Site were obtained during a search of online data sets.

8.96 No water voles were recorded within the study area, with only very limited suitable habitat for the species identified.

Fish

8.97 Timed and semi quantitative electrofishing surveys and a general fish habitat assessment of the burns were carried out by the Findhorn, Nairn and Lossie (FNL) Fisheries Trust and are detailed within **Technical Appendix 8.6** and Figure 8.4. These surveys covered the Burn of Lochan Tutach, Stripe of Muckle Lyne and Stripe of Little Lyne which drain from the Site and also Dorback Burn, Lyne Burn and Tomnarroch Burn which flow outwith the Site. All the survey points were located off-site. The Burn of Lochan Tutach, Stripe of Muckle Lyne, Stripe of Little Lyne, Lyne Burn and Tomnarroch Burn each had one timed electrofishing survey point. Dorback Burn had three timed electrofishing survey points. Two semi quantitative electrofishing points were also surveyed on the Dorback Burn in line with historic survey points, allowing for comparisons from eight previous surveys here spanning from 1998 to 2011.

8.98 Atlantic salmon *Salmo salar* fry were only recorded on the Dorback Burn, at the three timed electrofishing survey points (catch per unit efforts (CPUE) ranging from 1.0 to 2.3 fish/min) and at both of the semi quantitative electrofishing survey points (at densities of 14.6 and 4.9 fish/100m respectively). Brown trout *Salmo trutta* fry were recorded on all but the Stripe of Muckle Lyne and the Stripe of Little Lyne. CPUE across the four burns containing trout fry ranged from 0.1 to 2.7 fish/min and densities of trout fry on the Dorback Burn were recorded at 1.8 and 9.0 fish/100m.

8.99 Atlantic salmon parr were also only recorded on the Dorback Burn with CPUE ranging from 1.7 to 4.4 fish/min and at densities of 26.4 and 14.6 fish/100m. Brown trout parr were recorded on all six burns surveyed with CPUE ranging from 0.1 to 0.7 fish/min and at densities of 1.8 and 2.8 fish/100m on the Dorback burn.

8.100 Second(+) year Atlantic salmon were also only recorded on the Dorback Burn with CPUE ranging from 0.5 to 1.8 fish/min and at a density of 1.8 fish/100m. Second(+) year brown trout adults were recorded on all but the Stripe of Little Lyne and Lyne Burn. CPUE across the four burns containing adult trout ranged from 0.1 to 0.2 fish/min and densities of adult trout on the Dorback Burn were recorded at 0.9 and 0.7 fish/100m.

8.101 Minnows *Phoxinus phoxinus* were also recorded on the upper Dorback Burn above Dava Bridge. These have most likely been accidentally established from discarded bait from the 'drop minnow' technique by anglers brown trout fishing at Lochindorb in the past. The effect of minnows on native fish populations is unknown but they are likely to compete for food and habitat.

8.102 The results confirm the findings from the general habitat assessment, with the main stem of the Dorback Burn generally more suited to juvenile salmon as seen in the three timed electrofishing surveys and also the two density surveys. It is noted that juvenile trout were also found at all points along the Dorback Burn but at lower densities. The timed electrofishing results from the smaller burns also agree with the findings of the general habitat assessment that trout are much more prevalent and salmon are absent. The Burn of Lochan Tutach and Tomnarroch Burn recorded good numbers of trout across all age ranges as considered likely when accounting for the narrowness of the burns and extensive draped vegetation in the general habitat assessment. On the Lyne Burn and the Stripe of Muckle Lyne and Stripe of Little Lyne tributaries trout numbers were low, this again correlates with the general habitat assessment as the burns are steep and fast flowing and both tributaries are blocked to adult trout by weirs.

8.103 The current survey shows that the Dorback Burn and the tributaries around Cairn Duhie support good populations of salmon and trout. The high CPUE of trout fry in the Burn of Lochan Tutach suggests that this is an important spawning stream for trout. On Dorback Burn, comparisons with historic density data (1998-2011) indicated that trout and salmon densities recorded this year (2012) were within range and at one site the densities of salmon parr and trout fry were higher than expected. The River Findhorn (into which the Dorback Burn drains) supports an important salmon and sea trout fishery. In recent years there has been a decline

of returning sea trout to the river, the cause for which is yet unknown, and this is increasing the importance of the existing juvenile trout population and the river habitat itself.

Additional Fauna

8.104 Due consideration was given to the potential for the Site to support additional protected species such as pine marten, red squirrel and Scottish wildcat and searches for these species were also undertaken (see **Technical Appendix 8.4**). No signs of the presence of any of these species were recorded from the Site, with the habitats present deemed to be sub-optimal with regards all of the above.

8.105 Incidental records of reptiles were made of viviparous (common) lizard *Zootoca vivipara* at fairly low densities from across the bog and heath habitats on the Site during Extended Phase 1 surveys, with adder *Vipera berus* presence also confirmed through the identification of a shedded skin. Due to the low densities recorded and the lack of identified areas for hibernating/basking reptiles these species are not considered further in this assessment.

8.106 The only waterbody within 500 m of the Site – Lochan Tutach – does not have any potential to support great crested newt *Triturus cristatus* by virtue of the likely prohibitively acidic conditions and the presence of fish and waterfowl.

8.107 Freshwater pearl mussels (FWPMs) *Margaritifera margaritifera* have been scoped out of the assessment due to the lack of suitable watercourses on Site. The watercourses on Site are peaty in nature, whereas FWPMs require a good mix of gravel and cobble substrate. As this Environmental Statement considers salmonid species outwith the Site but within the catchment area, the mitigation proposed for protecting those watercourses is considered equally suitable should FWPM be present in those areas.

Future Baseline – The 'Do Nothing' Scenario

8.108 The Site is comprised of habitats indicative of ongoing anthropogenic influence, albeit at relatively low levels. In the absence of a wind farm at the site it is likely that the existing habitats would prevail but at varying levels, reflecting the effects of current management across the site. This is likely to be most applicable to the bog and heath habitats which will be the most affected by changes to site hydrology (an ongoing effect of the drainage, burning, cutting and tree encroachment on the Site). In light of this, it is possible to conclude that the relative ecological interest of the Site will gradually decline over time under the current management.

Potential Impacts

8.109 This assessment concentrates on the effects of construction, operation and decommissioning of the proposed Wind Farm Development upon those ecological receptors identified during survey work.

8.110 In terms of impacts upon habitat receptors, the following will be assessed:

- Designated areas – effects here include direct (i.e. derived from land-take) and indirect (i.e. changes caused by effects to supporting systems such as groundwater);
- Terrestrial habitats – effects here include direct (i.e. derived from land-take) and indirect (i.e. changes caused by effects to supporting systems such as groundwater);
- Aquatic habitats – effects here are limited to changes in water conditions through potential pollution effects; and
- Protected species – effects here include direct (i.e. loss of individuals from the population as a result of the proposed extension; loss of key habitat; displacement from key habitat; barrier effects preventing movement to/from key habitats; and general disturbance) and indirect (i.e. loss/changes of/to food resources; population fragmentation; degradation of key habitat e.g. as a result of pollution).

Potential Construction and Decommissioning Impacts

Designated Sites

8.111 There are two ecological designated sites within 5 km of the Site. Moidach More SSSI/SAC is designated for its blanket bog habitat and is located approximately 3 km to the east of the Site. As the designated feature is vegetation and the Site is not hydrologically connected, there will be no impact to the designations; therefore, it is not considered further in this assessment.

8.112 Lower Findhorn Woods SSSI/SAC is designated for its mixed woodland, bryophytes and oligotrophic running water and is located approximately 3 km to the north of the Site. As two of the designated features are vegetation and the site is 3 km downstream of the Site, it considered that there will be no impact to the designations; therefore, it is not considered further in this assessment.

Wet Modified Bog

8.113 Wet modified bog is the most abundant habitat type across the Site and is characterised by an absence of key Sphagnum species together with an abundance of hare's-tail cottongrass and more rank heather in most places. Evidence of historic and ongoing management to the detriment of the habitat is present in the form of active drains, recent vegetation cutting, tree encroachment and localised burning.

8.114 Effects upon wet modified bog habitat during construction will be direct (through habitat loss) and indirect (through drying effects upon neighbouring bog habitats). The total amount of direct habitat loss will be 10.09 ha, which represents 2.77% of the overall habitat extent across the Site. In addition, and for the purposes of this assessment, this figure has been increased to allow for indirect losses as a result of the zone of drainage around infrastructure (it is acknowledged that full habitat loss within this buffer is not guaranteed, but is assumed to enable an assessment of the 'worst-case' in this regard). In order to quantify this and when considering the assumptions from the carbon calculator (see **Technical Appendix 11.1**) that a drainage zone of 20 m will occur around drainage features, the overall loss is considered to be 31.47 ha (8.69% of the overall habitat).

Wet Dwarf Shrub Heath

8.115 Wet dwarf shrub heath habitat is abundant across the Site, breaking up the total dominance of wet modified bog and extending across large areas. The habitat is generally characterised by the abundance of deergrass, with heather, cross-leaved heath, purple moor grass and common cottongrass all locally abundant.

8.116 Effects upon wet dwarf shrub heath during construction will be direct (through habitat loss) and indirect (through drying effects upon neighbouring habitats). The total amount of direct habitat loss will be 7.90 ha, which represents 5.37% of the overall habitat extent within the Site. In addition, and for the purposes of this assessment, this figure has been increased to allow for indirect losses as a result of the zone of drainage around infrastructure (see paragraph 8.113) and is considered to be 25.44 ha (17.29% of the overall habitat).

Dry Dwarf Shrub Heath

8.117 Dry dwarf shrub heath habitat is generally confined to the more raised areas of the Site, most notably the slopes of Cairn Duhie. The habitat is generally characterised by dense heather, with few associates in most places. There are localised abundances of bilberry, cowberry, crowberry and bearberry.

8.118 Effects upon dry dwarf shrub heath during construction will be direct (through habitat loss). The total amount of direct habitat loss will be 3.31 ha, which represents 6.48% of the overall habitat extent within the Site.

Blanket Bog, Fen, Acid/Neutral Flush and Valley Mire

8.119 The blanket bog across the Site is generally of relatively good quality, with an abundance of *Sphagnum papillosum* and hare's-tail cottongrass. The habitat will have undoubtedly been far greater in extent in the past, but will have suffered from the general drying that has taken place, especially around those heavily drained parts of the Site in the south.

8.120 Fen habitats are scattered across the Site at fairly low levels, often in association with the minor watercourses here.

8.121 Acid/neutral flush habitat is confined to a single pocket of poor M6 habitat on the Site. The habitat is generally characterised by a species poor flora, with soft rush and *Sphagnum fallax* almost exclusively dominant.

8.122 Valley mire habitat is limited to a single small area in the east of the Site. The habitat is generally similar to the acid/neutral flush as described above but covers a discrete area within a minor watercourse 'valley' as opposed to a linear feature indicative of surface water movement.

8.123 Direct effects on these habitats have been avoided through sensitive design and as a result there will be no direct losses to this habitat. Furthermore, none of the infrastructure is located within close enough proximity for there to be any indirect losses via local alterations to the hydrological regime. These receptors are therefore not considered any further within this assessment.

Semi-natural Broadleaved Woodland

8.124 According to the felling plan (refer to **Chapter 4 – Description of Development**) trees within areas of semi-natural broadleaved woodland will be felled when they reach a critical maximum height of 6-10 m throughout the construction phase of the Development. There will be gradual direct loss of this habitat. This habitat is considered to be widespread and common; therefore of negligible conservation value. Receptors falling below local value are not normally considered in detail in the assessment process and so this receptor will not be considered further in this assessment.

Running Water

8.125 Running water habitat is relatively limited in extent across the Site, with minor watercourses present in the far south, north and northeast of the Site only. These watercourses drain into the River Findhorn, via the Dorback Burn in the first instance and are fairly typical of upland headwaters, being fast-flowing burns over a peat-dominated substrate and flanked by species-poor marshy grassland/fen vegetation.

8.126 There will be no loss of this habitat type, although there is the potential for these watercourses to become degraded as a result of potential pollution incidents.

Bats

8.127 Based on the survey results, there would be no direct loss of roosts or impact on bats or their roosts through indirect disturbance activities during construction.

Fisheries

8.128 The fisheries surveys revealed the presence of Atlantic salmon and brown trout across the majority of the Site, with the wider catchment (River Findhorn) known to support healthy populations of these species.

8.129 The main potential impact during construction would be pollution to the watercourses which render them uninhabitable to the resident fish stocks.

Potential Operational Impacts

Wet Modified Bog

8.130 During the operational period, the wind farm infrastructure has the potential to cause drying of the bog habitats on the Site through increased drainage. The wet modified bog across the site will be directly affected to a greater extent than any other habitat (by virtue of its relative abundance).

Wet Dwarf Shrub Heath

8.131 During the operational period, the wind farm infrastructure has the potential to cause drying of the wet heath habitats on the Site through increased drainage. The wet dwarf shrub heath across the Site will be directly affected to a greater extent than any other habitat bar wet modified bog (by virtue of its relative abundance).

Dry Dwarf Shrub Heath

8.132 The wind farm infrastructure would not cause any further loss/disturbance to this habitat during operation.

Blanket Bog, Fen, Acid/Neutral Flush and Valley Mire

8.133 During the operational period, the wind farm infrastructure has the potential to cause drying of the bog habitats on the Site through increased drainage. The blanket bog across the Site has been wholly avoided through the design process, and is therefore not considered any further within this section.

8.134 The wind farm infrastructure would not cause any further loss/disturbance to fen, acid/neutral flush or valley mire habitat during operation, and is therefore not considered any further within this section.

Semi-natural Broadleaved Woodland

8.135 According to the felling plan (refer to **Chapter 4 – Description of Development**) trees within areas of semi-natural broadleaved woodland will be felled when they reach a critical maximum height of 6-10 m throughout the operation phase of the Proposed Wind Farm Development. There will be gradual direct loss of this habitat. This habitat is considered to be widespread and common; therefore of negligible conservation value. Receptors falling below local value are not normally considered in detail in the assessment process and so this receptor will not be considered further in this assessment.

Running Water

8.136 During the operational phase, a risk exists that pollution would occur to the watercourses within the Site from the maintenance activities that would be required.

Bats

8.137 During the operation phase, a risk exists with regard to the potential collision risk upon bat species, together with the risk that animals are affected by barotrauma when flying in proximity of the turbines. For the purposes of this assessment, the potential impacts from barotrauma are assumed to be the same as for collision risk. This is due to the lack of published empirical evidence in causes of bat fatalities around wind farms and the difficulties in determining whether bat fatalities are due to strikes (collisions) with the turbine blades or barotrauma.

Fisheries

8.138 There is the potential for pollution incidents to occur during the operational phase of the wind farm which may affect the fish species recorded.

Mitigation

8.139 In light of the potential effects as detailed above, a number of mitigation measures are proposed in order to minimise these effects, to be implemented at various stages of the Proposed Wind Farm Development, as follows:

Mitigation through Design

8.140 An iterative design process allowed the incorporation of various ecological constraints in order that impacts can be prevented / minimised from the outset. This has resulted in avoidance of key habitat areas such as Annex I blanket bog and fen, and has also seen all watercourses on the Site being avoided by at least 50 m (a measure which is multi-faceted by virtue of the multiple resources associated with the watercourses and as such reduces potential impacts to fish and relevant protected species).

8.141 GWDTEs have also been considered through the design process, with iterations to the infrastructure layout made to adhere to the SEPA[3]-recommended buffer distances, where possible. In broad terms, GWDTEs generally correspond to areas of deeper peat. The design process also avoided, where possible, areas of peat depth greater than 1.5 m (as measured in the Peat Depth Survey, refer to **Technical Appendix 8.3 Peat Depth Survey and Information to Inform an Assessment of Blanket Mire Condition**). This has resulted in the infrastructure being located within the recommended distance from just six areas of GWDTE, three of which are considered highly dependent and three are considered medium dependent. **Chapter 11 – Hydrology, Hydrogeology and Geology** details this process further and concludes that no significant effects on GWDTE are predicted.

Measures Prior to Construction and Decommissioning

8.142 Arrangements for pre-construction ecological and baseline water quality monitoring are set out in a draft Construction and Decommissioning Method Statement (draft CDMS) which is presented as **Technical Appendix 5.1** of this ES.) The draft CDMS will ultimately require to be approved by the planning authority in consultation with SEPA.

Mitigation during Construction

8.143 Pollution prevention mitigation measures and arrangements for ecological and water quality monitoring during construction are also set out in the draft CDMS. These measures have been designed in order that the watercourses on Site (and those into which the Site discharges) are protected against pollution. These aspects of the draft CDMS should be monitored by a suitably qualified Ecological Clerk of Works (ECoW).

8.144 The ECoW would also be required to advise and supervise, where appropriate, and would have the power to stop works at any stage should it be deemed necessary.

8.145 Trees that fall within the stand-off distance between the turbines and woodland edges/hedgerows for bat mitigation (paragraph 8.180) will be felled to move edge features away from turbines. This will reduce the collision risk for bat species using the Site.

8.146 To minimise the loss of trees on Site, as trees are felled when they reach critical height (see **Chapter 4 – Project Description of Development**) a new tree will be planted to replace the felled tree. Felled trees will be replaced by a native species that is already present at the area. Trees that fall within the stand-off distance for bat mitigation (paragraph 8.180) will not be replanted to ensure this buffer is maintained. Felled/not replanted trees due to bat buffers would be compensated for by new birch woodland planting around the control room and substation compound and the site entrance. This practice will be continued throughout the operational phase of the Proposed Wind Farm Development.

8.147 Monitoring of fish species and invertebrate species would be conducted, as recommended by Findhorn, Ness and Lossie Fisheries Trust (FNLFT) as a best practice measure. It is recommended that the same sample locations from the baseline survey are used. The surveys would be conducted periodically throughout the life of the Proposed Wind Farm Development. The methodology for these surveys would be detailed in the CDMS and agreed with the Planning Authority prior to commencement of construction. The results of these surveys would provide information regarding status of the water quality in addition to the water quality monitoring proposed in **Chapter 11: Geology, Hydrogeology and Hydrology**.

Mitigation and Enhancement during Operation

8.148 An Ecological Management Plan, will form part of the final CDMS and will contain provisions, such as habitat management undertakings, that relate to the operational period and it will remain a live document for the lifetime of the Proposed Wind Farm Development. This will be finalised in detail at the pre-construction stage.

8.149 Although blanket bog on Site will not be impacted by the Development (paragraphs 8.118 to 8.122), measures to restore areas of blanket bog are proposed as an enhancement measure, refer to **Technical Appendix 8.7 Outline Habitat Management Plan (HMP)** and Figure 8.5. The aim of this will be to restore blanket bog across two separate areas in the northeast and south of the Site. This represents an enhancement measure and will negate the losses to wet modified bog. These measures shall also have positive ramifications for Golden Plover (see **Chapter /98 – Ornithology for further information**).

8.150 The measures included within the Outline HMP have been agreed with the landowner and shall be implemented post-construction.

8.151 As detailed in paragraph 8.145, monitoring of fish species and invertebrate species would be conducted throughout the life of the Proposed Wind Farm Development.

Assessment of Residual Effects

8.152 This section provides an assessment of the residual effects of the Proposed Wind Farm Development on the Valued Ecological Receptors. For each of these, the residual effect is assessed for each of the construction, operation and decommissioning phases of the Proposed Wind Farm Development.

8.153 A summary of the habitats and species identified as Valued Ecological Receptors at the Site is given in Table 8.7, together with the justification for this qualification.

8.154 Only those receptors confirmed across the Site and considered to be 'Valued' are detailed below (i.e. species such as otter and water vole which were confirmed as being absent from the Site are not considered any further). Those receptors considered to be of negligible Nature Conservation Value are not considered any further.

Table 8.7 Nature Conservation Value of Confirmed Valued Ecological Receptors within the Site

Valued Ecological Receptor (VER)	Nature Conservation Value	Relevant Legislation/Guidance; Justification
Wet Modified Bog	Local	The wet modified bog across the Site is a relatively degraded example of blanket bog habitat. Despite this association with Annex 1 blanket bog, the habitat is degraded to an extent that assigning value higher than Local is not deemed appropriate. In addition, bog habitat of this quality (and greater) is relatively widespread across the Highland region, which further reduces the relative value of this habitat across the Site. With all this in mind, a nature conservation value of Local is deemed appropriate.
Wet Dwarf Shrub Heath	Regional	Wet dwarf shrub heath is listed as an Annex 1 Priority Habitat within the Habitats Directive and it is listed as a priority habitat on the HLBAP (as 'Upland Heath'). The wet heath across the Site is fairly typical of the communities that extend across much of the Highland region, with typical plant species represented at fairly standard abundances. In spite of this, and given its Annex 1 status, a Regional nature conservation value is considered appropriate.
Dry Dwarf Shrub Heath	Local	Dry dwarf shrub heath is listed as an Annex 1 Priority Habitat within the Habitats Directive and is also listed as a priority habitat on the HLBAP (as 'Upland Heath'). The habitat across the Site is a relatively poor example, with a heavy dominance by heather in most places, often to the total exclusion of other higher (vascular) plant species. In light of this, a nature conservation value of Local is assigned.
Running Water	Local	Watercourses are listed on both the UKBAP and on HLBAP (as 'Rivers'). The watercourses here are situated entirely within the River Findhorn catchment and thus have no association with any designated sites. The watercourses are fairly non-descript in terms of the channel characteristics, associated vegetation and fauna and are therefore considered to be of no greater than Local nature conservation value, mainly by virtue of the catchment within which they sit.
Bats	Local	All bat species are listed on Annex IV of the Habitats Directive, and fully protected through The Habitats Regulations. Two species of bat are also listed as priority species on the HLBAP, including soprano pipistrelle, recorded from the Site. No roosts were identified here, and bat activity as a whole was low. The bat populations utilising the Site are therefore considered to be of Local nature conservation value.

Table 8.7 Nature Conservation Value of Confirmed Valued Ecological Receptors within the Site		
Valued Ecological Receptor (VER)	**Nature Conservation Value**	**Relevant Legislation/Guidance; Justification**
Fish	Regional	Atlantic salmon, brown trout and European eel are listed as priority species on the UKBAP, with both Atlantic salmon and European eel being listed as priority species on the HLBAP. The Site is drained by tributaries of the Findhorn catchment, which is a typical watercourse of the region, with no special designation afforded to it. However; the watercourses within the immediate vicinity of the Site were seen to support important populations of salmon and trout, including likely spawning grounds. The fisheries interests are therefore considered to be of Regional nature conservation value.

Residual Construction and Decommissioning Impacts

8.155 The most tangible effect during the construction stage of the Proposed Wind Farm Development will be direct habitat loss. Table 8.8 below details the estimated relative losses expected to occur, by habitat type.

Table 8.8 Estimated Loss of Habitat (by area and percentage of habitat type) Within the Site[6]		
Valued Ecological Receptor	**Actual Loss (ha)**	**Relative Loss by Habitat (%)**
Wet Modified Bog	10.09	2.79
Wet Dwarf Shrub Heath	7.90	5.37
Dry Dwarf Shrub Heath	3.31	6.48

8.156 The following sections assess the effect of these losses for each VER. Only those of local nature conservation importance or greater are considered (see Table 8.7).

Wet Modified Bog

8.157 When considering potential impacts upon this receptor (as described within paragraphs 8.113-8.114), and accounting for the relative abundance of the habitat within the wider area, an effect magnitude of **Low** spatial and **Short to Long Term** temporal is assigned (by virtue of some areas being immediately reinstated post-construction according to best practice[7],[8]).

8.158 The wet modified bog within the Site has a nature conservation value of **Local**; the overall effect significance is therefore considered to be Negligible and **not Significant** under the terms of the EIA Regulations, when considering the enhancement measures described in paragraph 8.149.

Wet Dwarf Shrub Heath

8.159 When considering potential impacts upon this receptor (as described within paragraphs 8.115-8.116) and accounting for the relative abundance of the habitat within the wider area, an effect magnitude of **Moderate** spatial and **Short** to **Long Term** temporal is assigned (by virtue of some areas being immediately reinstated post-construction).

8.160 The wet dwarf shrub heath within the Site has a nature conservation value of **Regional**; the overall effect significance is therefore considered to be **Minor** and **not Significant** under the terms of the EIA Regulations.

Dry Dwarf Shrub Heath

8.161 When considering potential impacts upon this receptor (as described within paragraphs 8.117-8.118), and accounting for the relative abundance of the habitat within the wider area, an effect magnitude of **Low** spatial and **Short** to **Long Term** temporal is assigned (by virtue of some areas being immediately reinstated post-construction).

8.162 The dry dwarf shrub heath across the Site has a nature conservation value of **Local**; the overall effect significance is therefore considered to be **Minor** and **not Significant** under the terms of the EIA Regulations.

Running Water

8.163 All watercourses have been avoided through the design process (and buffered to at least 50m) and with the implementation of mitigation measures detailed within paragraph 8.125, this will ensure that any potential effect magnitude will be **Negligible** spatial and temporal.

8.164 The running water habitat within the Site has a nature conservation value of **Local**; the overall effect significance is therefore considered to be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Bats

8.165 Based on the survey results, there would be no direct loss of roosts or impact on bats or their roosts through indirect disturbance activities during construction. This receptor is therefore not considered any further here.

Fisheries

8.166 When considering potential impacts upon this receptor as described within Paragraph 8.129, and incorporating the mitigation as detailed within Paragraph 8.143, an impact magnitude that is **Negligible** spatial and temporal is considered applicable.

8.167 In light of the likely importance of the Dorback Burn and its tributaries to the salmonid recruitment of the catchment (River Findhorn), the fisheries interest here is considered to be of **Regional** nature conservation value. The overall effect significance is therefore considered to be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

[6] The difference between the figures in Table 8.8 and the land-take area in Table 4.4 is due to a 45 m buffer being applied around each turbine to cover the potential location of the transformer. The habitat loss figure generated by this value is much greater than the transformer itself (28 m^2). This approach has been taken because the exact location of the transformer adjacent to the turbine is not certain and, as habitat mosaics may exist around turbines, it is prudent to present a worst case scenario of the extent of the different types of habitat that could be lost.

[7] Scottish Renewables, SNH, SEPA, FCS (2010) Good Practice During Windfarm Construction, version 1, October 2010.

[8] Scottish Renewables, SNH, SEPA, FCS (2011) Developments on Peatland: Guidance on the Assessment of Peat Volumes, Resue of Excavated Peat and the Minimisation of Waste, Version 1, December 2011.

Residual Operational Impacts

Wet Modified Bog

8.168 When considering potential impacts upon this receptor as described within Paragraph 8.130 and accounting for the relatively low habitat quality and abundance of its kind within the wider area, the magnitude of effects of the infrastructure during operation are considered to be **Negligible** spatial and temporal.

8.169 The wet modified bog within the Site has a nature conservation value of **Local**. The effect would therefore be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Wet Dwarf Shrub Heath

8.170 When considering potential impacts upon this receptor as described within Paragraph 8.131, and accounting for the relatively low habitat quality and abundance of its kind within the wider area, the magnitude of effects of the infrastructure during operation are considered to be **Negligible** spatial and temporal.

8.171 The wet dwarf shrub heath within the Site has a nature conservation value of **Local**. The effect would therefore be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Dry Dwarf Shrub Heath

8.172 The wind farm infrastructure would not cause any further loss/disturbance to this habitat during operation and is therefore not considered any further within this section.

Running Water

8.173 When considering potential impacts upon this receptor as described within Paragraph 8.136, this effect after mitigation detailed within Paragraph 8.142 will be of **Negligible** spatial and temporal magnitude.

8.174 The running water habitat within the Site has a nature conservation value of **Local**; the overall effect significance is therefore considered to be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Bats

8.175 When considering potential impacts upon this receptor as described within Paragraph 8.136, the following species-based residual impacts are considered.

8.176 Common and soprano pipistrelle bats are assessed by Natural England (2012[9]) guidance to be of medium risk in terms of collision although they are of low risk in terms of any threat to national populations. These pipistrelle species regularly fly at low heights, typically less than 25 m and, assuming that their behaviour is not modified by the presence of turbines, then the collision risk of common and soprano pipistrelle bats is considered to be low, particularly as the turbines are generally located in open areas and sited away from significant edge features. The spatial and temporal magnitudes of effects on the populations of these two species across the Site are therefore considered to be **Negligible** when the low levels of activity are considered. This would result in an overall **Negligible** and **Not Significant** effect under the terms of the EIA Regulations.

8.177 Daubenton's bats are assessed by Natural England guidance to be of low risk in terms of collision and threat to national populations. When considering the very low levels of total activity across the Site, the effect magnitude on this species is considered to be **Negligible**, which results in an overall **Negligible** and **not Significant** effect under the terms of the EIA Regulations.

8.178 A further consideration to the above assessment is the maintenance of a stand-off distance between the turbines and all woodland edges/hedgerows on Site, in line with Natural England guidance (2012). Some tree felling will be conducted as part of the Proposed Wind Farm Development (see **Chapter 4 -Description of Development**) to remove trees within the stand-off distance and also to remove trees that are over the critical height. The recommended stand-off distance between the feature and the centre of the turbine has been calculated using the following equation:

$$\mathrm{b} = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

8.179 Where bl = blade length; hh = hub height; and fh = feature height

8.180 Feature height is 10 m as the trees will be felled when they reach this critical height (refer to **Chapter 4 - Description of Development**). This results in a stand-off distance of 77.5 m as follows:

$$\mathrm{b} = \sqrt{(50 + 45)^2 - (65 - 10)^2}$$

8.181 This stand-off distance will reduce the already minimal potential adverse effects further. The bat-tree stand off distance of 77.5 m has been rounded up to 80 m as a conservative measure.

Fisheries

8.182 When considering potential impacts upon this receptor as described within Paragraph 8.138, and incorporating the mitigation as detailed within Paragraph 8.142, an impact magnitude that is **Negligible** spatial and temporal is considered applicable.

8.183 In light of the likely importance of the Dorback Burn and its tributaries to the salmonid recruitment of the catchment (River Findhorn), the fisheries interest here is considered to be of **Regional** nature conservation value. This results in an impact of **Negligible** and **Not Significant** effect under the terms of the EIA Regulations.

[9] Natural England (2012). Bats and onshore wind turbines: interim guidance. TIN051.Second Edition.

Cumulative Assessment

8.184 A number of other wind farms are present within the wider area (both in planning and operational); however, it is not considered likely that any significant cumulative effects will arise (in line with SNH 2012[10]). This is due to the negligible/minor scale and nature of the predicted effects for the Proposed Wind Farm Development, the application of appropriate mitigation measures, and small geographical range of the species discussed in this Chapter.

Summary

Table 8.9: Summary of Potential Impacts of the Proposed Wind Farm, Mitigation and Residual Impacts

Potential Effect	Mitigation	Means of Implementation	Residual Effect
Construction			
Disturbance of Wet Modified Bog	Blanket bog restoration across two separate areas of the Site.	Technical Appendix 8.7 – Outline Habitat Management Plan.	Negligible (with minor positive effect on blanket bog)
Disturbance of Wet Dwarf Shrub Heath	None	n/a	Minor
Disturbance of Dry Dwarf Shrub Heath	None	n/a	Minor
Disturbance of Acid/Neutral Flush	None	n/a	None
Disturbance of/pollution to Running Water	Pollution prevention measures.	Implementation of the draft CDMS (see **Technical Appendix 5.1**)	Minor
Disturbance of Bats	None	n/a	None
Disturbance of Fish	Pollution prevention measures.	Implementation of the draft CDMS (see **Technical Appendix 5.1**)	Negligible
Operation			
Blanket Bog	Enhancement: Blanket bog restoration across two separate areas of the site.	HMP	Minor positive
Wet Modified Bog	Blanket bog restoration across two separate areas of the Site.	HMP	Negligible
Wet Dwarf Shrub Heath	None	n/a	Negligible
Dry Dwarf Shrub Heath	None	n/a	Negligible
Running Water	Pollution prevention measures.	Implementation of the draft CDMS (see **Technical Appendix 5.1**)	Minor
Bats	Negligible	None	Negligible
Fish	Pollution prevention measures.	Implementation of the SPP and Environmental Management and Pollution Prevention Plan (see **Technical Appendix 5.1**)	Negligible
Decommissioning	Same effects as construction phase		

[10] SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments.

9 Ornithology

Introduction

9.1 This chapter of the ES has been completed by MacArthur Green Ltd. It evaluates the potential and likely significant effects of the Proposed Wind Farm Development on those ornithological resources present within the study area. Effects on non-avian ecology are addressed separately in **Chapter 8: Ecology** of this ES.

9.2 This chapter is supported by the following Technical Appendices:

- **Technical Appendix 9.1**, which contains the following annexes:
  - Annex A - Legal Protection. This Annex details the legal protection afforded to Annex 1, Schedule 1 and wild birds in general;
  - Annex B – Bird Survey Methodologies;
  - Annex C and D - Survey Effort and Results;
  - Annex E - Collision Risk Assessments;
  - Annex F –2011 Breeding Bird Survey Report, August 2011; and
  - Annex G - Confidential Annex.

9.3 For the purposes of this assessment, the following definitions are made:

- the 'Site' – this is the area within which all wind farm infrastructure shall be contained (red line boundary shown in Figure 1.2: Site Boundary);
- the 'Proposed Wind Farm Development' which refers to the development in general;
- the 'study area' – this is the area within which surveys were undertaken and varies between certain survey methods (e.g. Breeding Raptor Survey Area = the Site plus an additional 500 m buffer), extents are detailed where relevant; and
- 'Collision Risk Analysis Area' – this is the area in which birds are at risk of collision with turbines. This area comprises a 250 m buffer around each turbine and collectively is defined as the 'Collision Risk Analysis Area' (CRAA) for the purposes of this assessment. This is required to inform accurate collision risk modelling (CRM – see Annex E).

9.4 This chapter details the methods used to establish the bird populations within the Site and its surroundings, together with the process used to determine the Nature Conservation Importance (NCI) (paragraph 9.43) of the bird populations present. The ways in which birds might be affected (directly or indirectly) by the construction, operation and decommissioning of the Proposed Wind Farm Development are explained, and the magnitude of any probable effects, and the significance of any likely effects, assessed**.** Potential cumulative impacts with other operational, consented or in-planning wind farms are considered within this chapter.

Legislation and Policy Context

International Legislation and Policy

Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive)

9.5 The main provisions of the Directive include the maintenance of all wild bird species across their natural range, with the encouragement of various activities to that end, and the identification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex 1 of the Directive, as well as for all regularly occurring migratory species.

National Legislation and Policy

The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations)

9.6 These regulations transpose Council Directive 92/43/EEC into national law. The Regulations provide for the designation of Natura 2000 sites, the protection of European Protected Species (EPS), and the adaptation of planning and other controls for the protection of Natura 2000 sites.

The Wildlife and Countryside Act 1981 (as amended)

9.7 The act makes it an offence to intentionally kill, injure or take any wild bird or to take, damage or destroy the nest of any wild bird while that nest is in use or being built (with certain exceptions). In addition, the act makes it an offence to intentionally or recklessly disturb birds and their young listed in Schedule 1(Part 1) at, on or near an 'active' nest.

The Nature Conservation (Scotland) Act 2004 (as amended)

9.8 The act places a duty on public bodies to further the conservation of biodiversity and increases protection for Sites of Special Scientific Interest.

The UK Biodiversity Action Plan (BAP)

9.9 The plan is the UK Government's response to the Convention on Biological Diversity (CBD), and describes the biological resources of the UK and provides detailed plans for conservation and enhancement of these resources, at national and devolved levels.

Regional Policy

North East Scotland Local Biodiversity Action Plan 2000

9.10 The Plan details the habitats and species deemed as important at a local level and receiving dedicated plans for their conservation as a result. The Plan also implements conservation required under the UKBAP where relevant.

Highland-wide Local Development Plan (2012)

9.11 This Plan details the specific planning policies that have been produced in order that strategic plans for development within the Local Authority area can be achieved within the context of an overarching vision. Those particular policies relevant to this chapter are as follows:

- Policy 28 – Sustainable Design;
- Policy 57 – Natural, Built and Cultural Heritage;
- Policy 58 – Protected Species;
- Policy 59 – Other Important Species;
- Policy 60 – Other Important Habitats; and
- Policy 67 – Renewable Energy.

Moray Local Plan (2008)

9.12 Moray Local Plan 2008 interprets the strategic direction provided by the Moray Structure Plan 2007 into detailed policies and proposals for use in the determining of planning policies. Those particular policies relevant to this chapter are as follows:

- E1: Natura 2000 Sites and National Nature Conservation Sites;
- E2: Local Nature Conservation Sites and Biodiversity; and
- BE4: Gardens and Designed Landscapes.

Issues Identified during Consultation

9.13 Formal consultation was undertaken with SNH, with informal discussions/liaison undertaken with The Royal Society for the Protection of Birds (RSPB), The Highland Raptor Study Group and Forestry Commission Scotland. Table 9.1 summarises the consultation responses received with regard to ornithology matters and provides information on where and how they have been addressed in the assessment.

Table 9.1 Issues Identified during Consultation

Consultee	Issue	Where/How this is addressed
SNH 30/05/2013 02/10/2012	Satisfied with nature and extent of bird survey work proposed. Requested specific information regarding impacts to designated sites Confirmed acceptance of survey approach.	No Action required. Addressed within sections 9.105, 9.115, 9.116, 9.151, 9.163, 9.169, 9.184, 9.192. No action required.
Moray Council	The south eastern boundary of the proposed development site abuts onto the (non-statutory) South	Addressed within sections 9.53 and 9.77
	West Moray Moors Lochans Site of Interest to Natural Science (SINS) which is based on biological interests i.e. Breeding gulls and wildfowl on Lochans, breeding Annexe 1 birds.	
RSPB 29/05/2013 20-24/01/2012	Confirmed acceptance of survey approach and extents. Provided breeding Target Species information.	No action required Addressed in 'Current Baseline' Section
HRSG 21 & 23/01/2012	Provided breeding raptor information.	Addressed in Confidential Annex
Forestry Commission 24/01/2012	Provided Target Species information.	Addressed in 'Current Baseline' Section

Assessment Methodology

Baseline Characterisation

9.14 A desk study, utilising online resources such as SNH Sitelink and the NBN Gateway has been undertaken to inform an assessment of the current baseline conditions on the Site. Relevant consultation responses from Forestry Commission Scotland, Highland Raptor Study Group and RSPB are detailed within **Table 9.1**.

9.15 All field surveys followed recommended methods, with the scope of all survey work confirmed with SNH as being suitable to inform an assessment for the Site (see **Technical Appendix 9.1**, Annex B).

9.16 Ornithological field work was first commenced in 2003, with additional work also undertaken in 2005[1]. Full bird surveys were then re-commenced in April 2011 and were completed in August 2012 and comprised the following specific surveys which were agreed in consultation with SNH (see Figures 9.1 and 9.2 for survey areas and Viewshed Analysis respectively):

- Flight activity Vantage Point (VP) surveys (covering areas within the 250 m buffer of the outer turbine envelope). April 2011 to August 2012 (Figures 9.3A and 9.3B);
- Upland Breeding Birds Surveys (BBS) (500 m buffer around the historic site boundary which extended a further 85 m to the south, running parallel to the current southern site boundary. Spring-summer 2011 (Figure 9.4);
- Breeding diurnal raptor (including Barn Owl and Short-eared Owl) surveys (2 km buffer around the Site). Spring-summer 2012 (Figure 9.5);

[1] Survey data collected during 2003 and 2005 does not necessarily follow standard SNH methodology is therefore is referenced only where deemed appropriate. This data has not been used for the purposes of collision risk modelling.

- Breeding Diver Surveys (1 km buffer around the Site and monitoring of a known Black-throated Diver nest site within 3 km of the Site). Spring/summer 2012 (Figure 9.1);
- Black Grouse lek surveys (1.5 km buffer around the Site). Spring 2012 (Figure 9.6); and
- Non-breeding bird/Winter Walkover surveys (winter period) (500 m buffer around the Site). Winter 2011 – 2012 (Figure 9.9).

9.17 The following assessment work is based mainly on the complete survey work undertaken from April 2011 until August 2012 inclusive, however the data collected prior to this (2003 and 2005) is referenced where deemed appropriate.

Method of Assessment

9.18 The assessment method follows the process set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ("the EIA Regulations") and guidance on the implementation of the EU Birds and Habitats Directive (SERAD, 2000[2]).

9.19 The information provided in this assessment provides adequate information to allow the competent authority to undertake an Appropriate Assessment should this be required (in line with the Habitats Directive). This will involve establishing whether the Proposed Wind Farm Development (either alone or in combination with other plans or projects) is likely to have a significant effect on the integrity of the relevant SPA(s). The SPA relevant to the Proposed Wind Farm Development is the Moray and Nairn Coast SPA/RAMSAR site. Further information on this SPA is also provided within **Technical Appendix 9.1**. Details of SPAs that have been scoped out are provided in Paragraph 9.73-9.76.

9.20 In assessing the effects, emphasis is given to the national and regional populations of the species as appropriate (or the SPA population where relevant).

Methodology for Assessing Adverse Effect on the Integrity of an SPA

9.21 The method for assessing the significance of a likely effect on the integrity of an SPA is different from that employed for wider-countryside ornithological interests. The Habitats Directive is transposed into domestic legislation by the Habitats Regulations. Regulation 48 indicates a number of steps to be taken by the competent authority before granting consent (these are referred to here as a 'Habitats Regulation Appraisal'). In order of application, the first four are:

- Step 1. Consider whether the proposal is directly connected to or necessary for the management of the site (Regulation 48 (1b)).
- If not, Step 2. Consider whether the proposal, alone or in combination, is likely to have a significant effect ('LSE') on the site (Regulation 48 (1a)).
- If so, Step 3. Make an Appropriate Assessment of the implications for the site in view of that site's conservation objectives (Regulation 48 (1)).
- Step 4. Consider whether it can be ascertained that the proposal will not adversely affect the integrity of the site ('Integrity Test') having regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which they propose that the consent, permission or other authorisation should be given (Regulation 48 (5 & 6). Relevant information can be considered at Step 2.

9.22 Finally, the EIA assessment methodology detailed below is employed as part of the Habitats Regulations Appraisal to aid in the appraisal process.

Methodology for Assessing Non-SPA Ornithological Interests

9.23 The evaluation of wider-countryside ornithological interests (interests unrelated to an SPA) involves the following process:

- identifying the potential effects of the Proposed Wind Farm Development;
- considering the likelihood of occurrence of potential effects where appropriate;
- defining the Nature Conservation Importance of the bird populations present;
- establishing the population's Conservation Status;
- establishing the Magnitude of the Likely Effect (both spatial and temporal);
- based on the above information, making a professional judgement as to whether or not the identified effect is significant with respect to the EIA Regulations;
- if a potential effect is determined to be significant, identifying measures to mitigate or compensate the effect where required;
- considering opportunities for enhancement; and
- considering residual effects after mitigation, compensation or enhancement.

9.24 For clarity, the following sections further define the methods used to evaluate Conservation Status, Magnitude of Likely Effects and Nature Conservation Importance.

Method Used to Evaluate Conservation Status of Bird Populations

9.25 As defined by SNH, the Conservation Status of a species is 'the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest (which for the purposes of the Birds Directive is the EU)' (SNH 2006, Para. 14[3]).

9.26 Conservation Status is considered favourable under the following circumstances (SNH 2006, Para.15):

- 'Population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- The natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and

[2] SERAD (Scottish Executive Rural Affairs Department) 2000. Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('the Habitats and Birds Directives'). Revised Guidance Updating Scottish Office Circular No 6/1995;

[3] Scottish Natural Heritage (2006) Assessing significance of impacts from onshore Wind farms on birds outwith designated areas.

- *There is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis'.*

9.27 SNH guidance states that '*An impact should be judged as of concern where it would adversely affect the favourable conservation status of a species, or stop a recovering species from reaching favourable conservation status, at international or national level or regionally*' (SNH 2006, Para. 17).

9.28 The relevant scale for breeding species is considered to be the appropriate Natural Heritage Zone(s) (NHZ) which the Proposed Wind Farm Development falls within. This Proposed Wind Farm Development falls within the Central Highlands NHZ (NHZ 10). For wintering or migratory species, the national population is often considered to be the relevant scale for determining effects on the conservation status (SNH 2006, Para. 20 & 21) and this approach is applied here.

Method Used to Evaluate the Magnitude of Likely Effects

9.29 An effect is defined as a change to the abundance and distribution of a population as a result of the Proposed Wind Farm Development. Effects can be adverse, neutral or favourable.

9.30 There can often be varying degrees of uncertainty over effects as a result of limited information. A precautionary approach is adopted where the response of a population to an effect is uncertain.

9.31 In determining the magnitude of effects, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.

9.32 The sensitivity of individual species to disturbance during relevant behaviours is considered when determining spatial and temporal magnitude of effects and is assessed using guidance described by Bright et al. (2006[4]), Hill et al. (1997[5]) and Ruddock and Whitfield (2007[6]).

9.33 In the case of non-designated sites, magnitude is assessed in respect of an appropriate ecological unit. In the present case, the appropriate unit for breeding species is taken to be the Central Highlands Natural Heritage Zone (NHZ 10) as defined by SNH (2006[4]).

9.34 Effects are judged in terms of magnitude in space and time. There are five levels of spatial effects and five levels of temporal effects as detailed in Tables 9.2 and 9.3 below respectively.

Table 9.2: Spatial Effect Magnitude

Spatial magnitude	Definition
Very high	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost through additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population lost through additive mortality.
Moderate	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20% of population lost through additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of population lost through additive mortality.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: < 1% population lost through additive mortality.

Table 9.3: Temporal Effect Magnitude

Temporal magnitude	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 26 years), except where there is likely to be substantial improvement after this period. Where this is the case, Long-Term may be more appropriate.
Long-Term	Approximately 15 - 25 years or longer (see above).
Medium-Term	Approximately 5 – 15 years.
Short-Term	Up to approximately 5 years.
Negligible	No effect.

Method Used to Evaluate the Nature Conservation Importance of Bird Populations

9.35 There are three levels of Nature Conservation Importance (NCI) as detailed below in Table 9.4.

[4] Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R. J., Gardner, S., Pearce-Higgins, J. & Wilson, E. (2006), *Bird Sensitivity Map to provide locational guidance for onshore wind farms in Scotland*. Royal Society for the Protection of Birds

[5] Hill, D.A., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. (1997). *Bird disturbance: improving the quality of disturbance research*. Journal of Applied Ecology 34:275-288

[6] Ruddock, M. & Whitfield, D. P. (2007). *A Review of Disturbance Distances in Selected Bird Species*, A report from Natural Research (Projects) Ltd to Scottish Natural Heritage 2007

Table 9.4: Determining Factors of a Population's Nature Conservation Importance	
Importance	**Definition**
High	Populations receiving protection by a SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines.
Moderate	The presence of species listed in Annex 1 of the Birds Directive (but population does not meet the designation criteria under selection guidelines). The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The presence of species noted on the latest Birds of Conservation Concern (BoCC) 'Red' list (Eaton et al. 2009[7]). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the Proposed Wind Farm Development. Species present in regionally important numbers (>1% regional breeding population).
Low	All other species' populations not covered by the above categories

9.37 'Target species' were taken to be those species of High and Moderate Nature Conservation Importance (Table 9.4).

Assessment Structure

9.38 The assessment is structured around the consideration of potential effects, including cumulative effects, of: construction, operation and decommissioning of the Proposed Wind Farm Development, within which the following bird species are considered:

- Bird populations of High Nature Conservation Importance are known to be present in the area (as confirmed through survey work and consultations). These include: Non-breeding Greylag Goose[8] (SPA population) and non-breeding Pink-footed Goose8 (SPA population); and
- Bird populations of moderate Nature Conservation Importance known to be present in the general area. This includes: Black Grouse, Golden Plover and Short-eared Owl. Effects upon Hen Harrier, Merlin, Osprey, Short-eared Owl, Red-throated Diver, Cuckoo and Skylark are scoped out (see paragraph 9.56 onwards).

Significance Criteria

9.39 The predicted significance of the effect has been determined through a standard method of assessment based on professional judgement, considering sensitivity (i.e. each bird species' relative sensitivity to disturbance), Conservation Status, Nature Conservation Importance and magnitude of impact. The significance criteria used in this assessment are listed below in Table 9.5.

[7] Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. and Gregory, R.D. (2009). Birds of conservation concern 3. The population status of birds in the United Kingdom, Channel Islands and Isle of Man, British Birds 102: 296-341

[8] Non-SPA birds (i.e. resident Greylag Geese, non-SPA wintering Greylag Geese and non-SPA Pink-footed Geese) are not considered as part of the assessment due to not being of Moderate or High nature conservation. These birds are Amber listed.

Table 9.5: Effect Significance	
Significance of Effect	**Description**
Major	The effect is likely to result in a long-term significant adverse effect on the integrity of a receptor.
Moderate	The effect is likely to result in a medium-term or partially significant adverse effect on the integrity of a receptor.
Minor	The effect is likely to adversely affect a receptor at an insignificant level by virtue of its limitations in terms of duration or extent, but there will probably be no effect on its integrity.
Negligible	No effect.

9.40 'Major' and 'Moderate' effects are considered to be Significant in the context of the EIA Regulations.

9.41 'Minor' and 'Negligible' effects are considered to be Not Significant in the context of the EIA Regulations.

Cumulative Assessment

9.42 The assessment of cumulative effects follows the same methodology as detailed in section 9.25 for species subject to EIA. The Habitats Regulations require the consideration of cumulative impacts – termed 'in combination' impacts in the Habitats Regulations (Regulation 48 paragraph 1a of the Habitats Regulations) and follow the method detailed in paragraph 9.21

9.43 Wind farms identified for the cumulative impact assessment are those situated within 20 km of the Site (utilising SNH connectivity guidance 2012[9]), although this is ultimately determined by the target species foraging range, as follows:

- Berry Burn;
- Bognie Farm;
- Cluny Farm;
- Hill of Glaschyle;
- Moy;
- Paul's Hill Phase 1 and 2;
- Rothes – Phase 1;
- Rothes – Phase 2; and
- Tom nan Clach.

9.44 Those wind farms within 20 km of the Moray and Nairn Coast SPA and subsequently included within an 'in combination' assessment are as follows:

- Berry Burn;

[9] SNH. 2012. Assessing Connectivity with Special Protection Areas (SPAs)

- Bognie Farm;
- Cluny Farm;
- Findhorn;
- Hill of Glaschyle;
- Kellas;
- Pauls Hill Phase 1 and Phase 2;
- Rothes – Phase 1; and
- Rothes – Phase 2.

9.45 Only species that occur at the Proposed Wind Farm Development Site will be discussed as it is only these species for which a cumulative effect is possible with the Proposed Wind Farm Development.

Limitations

9.46 Limitations exist with regard to the knowledge base on how some species, and the populations to which they belong, react to impacts. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

Project Assumptions

9.47 All electrical cabling between the proposed turbines and the Site substation will be underground and follow the proposed on-site access tracks. Connection between the substation and the electrical grid will form part of a separate application process.

9.48 Construction works on the Proposed Wind Farm Development, including tree clearance and construction of the Site access tracks, turbine hard standings, temporary construction compound and erection of the turbines are predicted to last up to 28 months. The number of bird breeding seasons potentially disrupted would depend on the month in which construction commences and the breeding season of the potentially affected species. The breeding season of most birds at the Proposed Wind Farm Development extends from April to July (Forrester et al. 200714). For the purposes of this assessment it is assumed that, for any given species of bird, construction activities would commence during the breeding season and would therefore potentially affect breeding for a maximum of three years, assuming that construction will take approximately 28 months.

Baseline Conditions

9.49 This section details:

- A brief summary of the Site characteristics;
- statutory nature conservation designations for birds within 20 km of the Site;
- birds recorded during field surveys (for full details see **Technical Appendix 9.1** and Figures 9.3 to 9.9); and
- a description of the 'Do Nothing' scenario in the absence of the Proposed Wind Farm Development.

Site Summary

9.50 For the purposes of this summary and the subsequent baseline descriptions, the Site is described in terms of its north/south orientation.

9.51 The Site comprises typical upland habitats, with a peat-based substrate vegetated with a mixture of heath and bog dominating. Plantation forestry is present to the north of the Site, with an oligotrophic[10] loch present to the immediate south. Topographically, the Site rises from all sides to the peak of Cairn Duhie in the approximate centre. There are several minor watercourses on the Site which sit within the River Findhorn catchment.

9.52 The Site is managed at a fairly low level for grazing, localised peat-cutting and burning. Evidence of more substantial management is present in the forms of systematic drainage channels especially prevalent in the south of the Site.

Statutory Nature Conservation Designations

9.53 The only statutory nature conservation designation considered relevant to this assessment is the Moray and Nairn Coast SPA. A number of other sites designated for their importance to bird species are situated within 20 km of the Site but these have been scoped out of the assessment for various reasons. This process is detailed in full from paragraph 9.73 to 9.76onwards.

9.54 Moray and Nairn Coast SPA is located approximately 18 km to the north of the Site (see Figure 9.8). The SPA is designated for the following qualifying species:

- Osprey, breeding;
- Oystercatcher, non-breeding;
- Velvet Scoter, non-breeding;
- Bar-tailed Godwit, non-breeding;
- Common Scoter, non-breeding;
- Dunlin, non-breeding;
- Wigeon, non-breeding;
- Greylag Goose, non-breeding;
- Long-tailed Duck, non-breeding;
- Pink-footed Goose, non-breeding;
- Red-breasted Merganser, non-breeding; and
- Redshank, non-breeding.

[10] defined as supporting low levels of plant nutrients and high dissolved oxygen levels.

Non-Statutory Nature Conservation Designations

9.55 South West Moray Moors Lochans Site of Interest to Natural Science is located immediately adjacent to the east and south of the Site. The site is designated for the following qualifying species: *Breeding gulls and wildfowl on lochans, Breeding Annex1 birds.*

Current Baseline

Birds of Prey (including Owls)

9.56 Goshawk was the only raptor Target Species confirmed as breeding within the study area (see **Technical Appendix 9.1**, Confidential Annex, Confidential Figure 2). The nesting pair successfully fledged three chicks. No Goshawk flightlines were recorded from across the Site.

9.57 Short-eared Owl was recorded during VP surveys on six separate occasions, with a single record within the CRAA and at PCH (for a total of 149.5 seconds). In addition, three observations of hunting birds were made during raptor surveys and it is considered likely that the species is breeding within the wider area, although no nest sites were identified (Figures 9.3A and 9.3B).

9.58 Five Hen Harrier flightlines were recorded during VP surveys although no birds were observed at PCH on the Site (Figures 9.3A and 9.3B). No breeding Hen Harriers were recorded from within the study area (Figure 9.5), with historical data (from the 2003 and 2005 breeding season surveys, and that obtained from the Highland Raptor Study Group – HRSG) also suggesting their absence in this regard.

9.59 Ospreys were recorded on three separate occasions during VP surveys, although none of these records were from within the CRAA and at PCH (Figures 9.3A and 9.3B). The species was also recorded during raptor surveys, overflying the Site (Figure 9.5). No breeding records for the species were made or obtained from within the study area (with no historical records from within the study area (i.e. from the 2003 and 2005 surveys, or as recorded by the HRSG).

9.60 A single Merlin flightline was recorded from the Site, with the bird spending 3.4 seconds at PCH within the CRAA (Figures 9.3A and 9.3B). No further records were made or obtained. No evidence of breeding was recorded within the study area, with no historical data to this effect, either from previous surveys or HRSG data.

9.61 A single Peregrine was observed overflying the Site during raptor surveys (Figure 9.5). No further records were made or obtained. No evidence of breeding was recorded within the study area, with no historical data to this effect, either from previous surveys or HRSG data.

Divers

9.62 A single Red-throated Diver flightline was recorded during VP surveys, above PCH (Figures 9.3A). No breeding Red-throated Divers were confirmed from within the study area, although non-breeding pairs were observed (including a pair feeding on Loch Tutach to the immediate south of the Site). In addition, records were obtained for likely breeding pairs outwith the study area.

9.63 No Black-throated Divers were recorded during VP surveys, however the species was observed feeding on Lochan Tutach (to the immediate south of the Site). A breeding pair from within 3 km of the Site was observed during 2012 with a single chick successfully fledged (see **Technical Appendix 9.1, Confidential Annex, Confidential Figure 3**).

Goose Species

9.64 A total of 1,003 Greylag Goose were recorded during VP surveys, with 234 birds recorded from within the CRAA and at PCH, totalling 11,739 bird-seconds (number of birds x time observed) (Figures 9.3A and 9.3B).

9.65 In addition, six skeins of Pink-footed Goose, totalling 470 birds were recorded during VP surveys, spending a total of 26,048 bird-seconds within the CRAA and at PCH (Figures 9.3A and 9.3B).

Waders

9.66 No Golden Plover flightlines were recorded, however six territories were identified across the study area during BBS surveys (see Figure 9.4).

Other Birds

9.67 Two separate Black Grouse leks were identified within the study area during surveys in 2012 (see Figure 9.6), with a peak count of four males recorded. In addition, a peak count of three female birds was made from within the study area during winter walkover surveys (Figure 9.9).

9.68 A group of three Whooper Swans was recorded off-site during VP surveys.

9.69 Passerine records for the Site were numerous. Common Crossbill, Skylark, Crested Tit and Grasshopper Warbler were confirmed as breeding on the Site along with an abundance of more common species such as Chaffinch and Great Tit (Figure 9.7). See **Technical Appendix 9.1** for full details.

Future Baseline - the 'do nothing' scenario

9.70 In the absence of the Proposed Wind Farm Development, these bird populations are likely to be maintained in the area. It is possible that in the absence of any controls on the continued encroachment of trees on the Site that greater numbers of woodland species would breed, with open moorland species (such as Golden Plover and Skylark) reducing in numbers.

Potential Effects

9.71 Following an ecological appraisal undertaken across the Site during 2011, which included a breeding bird survey, and when considering the Site's location and prevailing habitats together with our knowledge of similar sites within the north-east of Scotland, the following receptor groups were identified:

- Breeding birds;

- Wintering birds;
- Breeding/non-breeding birds overflying the Site; and
- Migrating birds overflying the Site.

9.72 Potential effects on birds associated with construction, operation and decommissioning of the Proposed Wind Farm Development include:

- Displacement through indirect loss of habitat if birds avoid the Proposed Wind Farm Development and its surrounding area due to construction activity, turbine operation and maintenance and visitor disturbance. Displacement can also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds;
- Direct habitat loss through construction of the Proposed Wind Farm Development infrastructure;
- Habitat modification due to change in land cover (e.g. deforestation or impacts on hydrology); and
- Death or injury through collision with turbine blades and towers, met masts, or fences associated with the Proposed Wind Farm Development.

Effects Scoped Out

9.73 Effects were scoped out on the basis of the desk-based and survey work undertaken. No effects were scoped out prior to the commencement of field surveys.

9.74 Effects upon Darnaway and Lethen Forest, Anagach Woods and Craigmore Wood SPAs have been scoped out due to their distance from the site (>5 km) when considered in the context of the qualifying species for the designation: Capercaillie. Forrester *et al.* (2007[11]) state that in Scotland, Capercaillie are '*generally sedentary, with seasonal movements of typically 1-2 km between summer and winter ranges*'. When considering the species reliance on very particular habitat types (a requirement for old-growth conifer forest, especially Scots Pine, open enough to support ground vegetation rich in dwarf shrubs, and ideally mixed with bogs and open patches of natural regeneration where herbs can proliferate (Picozzi et al. 1992[12]; Forrester et al. 2007[11])), the Site is deemed to be sufficiently distant for these SPAs to be scoped out. Abernethy Forest SPA (ca. 18 km) is also scoped out on similar grounds (the qualifying species here are Capercaillie, Scottish Crossbill and breeding Osprey).

9.75 Effects upon the Inner Moray Firth SPA/RAMSAR have been scoped out due to the distance from the Site (utilising connectivity distance guidance, SNH (2012[9]), the vast majority of the SPA is in excess of 20 km from the Site).

9.76 Effects upon all qualifying species apart from Greylag Goose and Pink-footed Goose at the Moray and Nairn Coast SPA have been scoped out due to the distance of this site from the Site (ca. 16 km; utilising connectivity distance guidance, SNH (2012[9])).

9.77 Effects on South West Moray Moors Lochans Site of Interest to Natural Science are scoped out. It is considered that the EIA method applied here for selection and assessment of target species takes into account any birds relevant to this designation. Greylag geese, Pink-footed geese, Golden Plover are likely to be relevant here and these are considered further in this assessment as target species.

9.78 Effects upon Goshawk have been scoped out due to the confirmed nest site being ca. 1.2 km from the closest infrastructure (see Technical Appendix 9.1, Confidential Annex and Confidential Figure 2). In addition, there were no flights of the species at Potential Collision Height (PCH) within the CRAA.

9.79 Effects upon the following species are scoped out due to the nature and/or scarcity of records made: Peregrine (single observation during raptor surveys; no breeding birds within 2 km); Hen Harrier (five flightlines recorded, none at PCH within the CRAA); no breeding birds within 2 km); Merlin (single flightline recorded for 3.4 seconds at PCH within the CRAA; no breeding within 2 km); Osprey (three flights recorded, none at PCH within the CRAA; no breeding within 2 km); Red-throated Diver (one flightline recorded, not at PCH; no breeding within 1.5 km); Whooper Swan (no flights within the CRAA or at PCH); Song Thrush (no confirmed breeding on the Site); and Cuckoo (single breeding pair outside of the Site).

9.80 Potential effects on Skylark have been scoped out. The Skylark population has suffered a well-documented and large population decline in the UK as a whole, although in Scotland an increase of 8% over the period 1995-2008 has been recorded. This species is considered to exhibit low sensitivity to disturbance and insignificant numbers, if any, birds would be displaced by wind farm construction and operation.

9.81 On the basis of the desk based and survey work undertaken, the professional judgment of MacArthur Green, experience from other relevant projects and policy guidance or standards it has been assumed, following SNH guidance (SNH 2010[13]), that collision risk for small passerine birds (e.g. pipits, finches, buntings, thrushes) is negligible and would have no effect on their populations because survival rates of small passerines in Britain are naturally low. Bird species that have high natural adult mortality rates tend to produce large, but often variable, numbers of young each year. For such species, low levels of additional mortality will have little influence on their population dynamics which tend to fluctuate from year to year. In contrast, species with low natural mortality and low reproductive output are very sensitive to any additional mortality to their populations (Forrester et al. 2007[14]). Collision risk for small passerines has therefore been scoped out as low collision rates will have negligible effect on populations.

9.82 Breeding birds present across the Site that are of less than Moderate Nature Conservation Importance (see Table 9.4) are not assessed but receive protection under the Wildlife and Countryside Act 1981 (as amended) and so will be included within standard construction good

[11] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. and Grundy, D.S. (2007). *The Birds of Scotland*. Scottish Ornithologists Club, Aberlady

[12] Picozzi, N., Catt, D.C. and Moss, R. 1992. Evaluation of capercaillie habitat. Journal of Applied Ecology 29: 751-762.

[13] Scottish Natural Heritage (2010) Survey Methods for Use in Assessing the Impacts of Onshore Wind farms on Bird Communities.

[14] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. and Grundy, D.S. (2007). The Birds of Scotland. Scottish Ornithologists Club, Aberlady

practice (e.g. Breeding Bird Protection Plan (BBPP – see paragraph 9.101). This includes non-target species such as Curlew and Oystercatcher.

Potential Construction and Decommissioning Impacts

9.83 The main potential effects of construction activities across the Site are the displacement and disruption of breeding and foraging birds as a result of noise and general disturbance. Effects on breeding birds would be confined to areas in the locality of temporary construction compounds, turbines, tracks and other infrastructure. Few attempts have been made to quantify the disturbance of birds due to activities of this type, and much of the available information is inconsistent. However, as a broad generalisation, larger bird species, those higher up the food chain, or those that feed in flocks in the open tend to be more susceptible to disturbance than small birds living in structurally complex habitats (such as woodland, scrub and hedgerow) (Hill *et al*. 1997[15]).

9.84 The following sections only relate to those effects considered relevant to the species.

Greylag Goose

9.85 *Effect – Flight Activity Displacement (All relevant conservation objectives apply):* Construction activities may displace birds from flying between their roosting and foraging grounds by virtue of increased local disturbance. A total of 1,110 Greylag Geese were recorded during VP surveys (including all flight bands) in 57 separate flocks during winter 2011/12 (Figures 9.3A and 9.3B).

Pink-footed Goose

9.86 *Effect – Flight Activity Displacement:* Construction activities may displace birds from flying between their roosting and foraging grounds by virtue of increased local disturbance. 469 Pink-footed Geese were recorded during VP surveys (including all flight bands) in 6 separate flocks during winter 2011/12 (Figures 9.3A and 9.3B).

Black Grouse

9.87 *Effect*: Lekking and foraging Black Grouse may be displaced from the Site during construction. Black Grouse surveys in 2012 recorded a single lek site, with a maximum count of four males. Furthermore, three Black Grouse hens were recorded either foraging or resting during winter walkover surveys across the Site (Figure 9.6 and Figure 9.9).

9.88 The lek site is situated approximately 1.8 km from the Site infrastructure (see Figure 9.6).

Golden Plover

9.89 *Effect*: Golden Plover nest sites may be disturbed during construction. Six nest sites were recorded during surveys in 2012, with three of these situated within 100 m of proposed infrastructure, and the remaining three ranging from 300 m to >1 km from proposed infrastructure (see Figure 9.4).

Short-eared Owl

9.90 *Effect*: Foraging Short-eared Owl may be displaced from the Site during construction. Short-eared Owl were recorded foraging across the survey area on four separate occasions, with two flights occurring around proposed Site infrastructure (Figures 9.3A and 9.3B).

Potential Operational Impacts

Greylag Goose (non-breeding)

9.91 *Effect*: 57 flights of 1,003 Greylag Goose crossed the Site during the non-breeding/migration seasons 2011/12, of which 11,738.97 bird-seconds were recorded from within the CRAA and at PCH (Figures 9.3A and 9.3B). General flight activity (i.e. not specific to the CRAA) recorded during surveys in 2005 was far lower, with five flights in total and a maximum skein size of 24 birds at PCH. The estimated rate of collisions upon the non-breeding Greylag Goose population is 0.384 collisions per year (equivalent to one bird killed every 2.6 years, or 9.6 birds over 25 years).

Pink-footed Goose (non-breeding)

9.92 *Effect*: Six flights of 469 Pink-footed Goose crossed the Site during the non-breeding/migration seasons 2011/12, of which 26048.14 bird-seconds were recorded at PCH within the CRAA (Figures 9.3A and 9.3B). General flight activity (i.e. not specific to the CRAA) recorded during surveys in 2005 was far lower, with a single flight of 46 birds above PCH. The estimated rate of collisions upon the non-breeding Pink-footed Goose population is 0.85 collisions per year (equivalent to one bird killed every 1.175 years).

Short-eared Owl

9.93 *Effect*: Four flights of Short-eared Owl were recorded from across the Site, with one of these at PCH within the CRAA for a total of 149.5 seconds (Figures 9.3A and 9.3B) . The estimated rate of collisions for Short-eared Owl is 0.02 collisions per year (equivalent to one bird killed every 48.24 years). Details of collision modelling data and calculations are in the **Appendix 9.1, Annex E.**

Displacement Effects

9.94 The displacement of nesting and foraging birds from the Site has the potential to extend beyond the construction phase, as described above, and to occur during the operational phase of the Proposed Wind Farm Development. Lower levels of disturbance will be expected during operation compared with construction which suggests that displacement effects will be less than those assessed for the construction. Displacement from operational turbines has been recorded in a number of studies conducted at wind farms, generally over distances of up to 100 m or 200 m from turbines, although the effects vary considerably between sites and species (Pearce-Higgins et al. 2009[40] and 2012[16]). Additional existing information (e.g.

[15] Hill, D.A., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. (1997). Bird disturbance: improving the quality of disturbance research. Journal of Applied Ecology 34:275-288.

[16] Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R.H.W. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49: 386-394

Whitfield et al. 2010[17]) suggests that these effects are minimal, with most species affected only slightly, if at all, whilst Drewitt and Langston (2006[19]) highlighted the need for further study in order to accurately quantify displacement effects. Devereux et al. (2008[18]) showed that wind farms had no, or at most a minimal, effect on the local distribution of wintering farmland birds.

9.95 Those studies mentioned above were focused on direct displacement (i.e. avoidance of areas surrounding wind farm installations); an additional consideration is the displacement of birds from larger areas where the turbines act as a barrier to bird movement. The likelihood of this effect occurring tends to increase with wind farm size, where large turbine arrays can force birds to alter their regular flight-paths, resulting in an increase in distance flown and so energy expended. However, a review of the literature suggests that none of the barrier effects identified so far have significant effects on populations (Drewitt and Langston 2006[19]). This was also the conclusion from modelling of potential increases in energy expenditure on those bird species most likely to be sensitive to barrier effects (large and long-lived breeding birds such as seabirds) by Masden et al. (2010[20]). Pearce-Higgins et al. (2009[40]) also observed that certain species experienced localised population increases in proximity to wind farm installations, presumably due to the introduction of new structures into the habitat. Thus the effects of wind farm presence on local bird populations can be either negative or positive.

Greylag Goose (non-breeding)

9.96 *Effect – Flight Activity Displacement:* The presence of the Proposed Wind Farm Development may displace birds from overflying the Site.

Pink-footed Goose (non-breeding)

9.97 *Effect – Flight Activity Displacement:* The presence of the Proposed Wind Farm Development may displace birds from overflying the Site.

Golden Plover

9.98 *Effect*: Golden Plover nest sites may be disturbed during operation. Six nest sites were recorded during surveys in 2012, with three of these situated within 100 m of proposed infrastructure, and the remaining three ranging from 300 m to >1 km from proposed infrastructure (see Figure 9.4).

Short-eared Owl

9.99 *Effect - Foraging Displacement*: Short-eared Owl may be displaced during operation. Four flights of Short-eared Owl were observed across the Site, for a total of 485.9 seconds. It is likely that the Site represents part of the foraging range for locally resident birds.

[17] Whitfield, D.P., Green, M. and Fielding, M.H. 2010. Are breeding curlew Numenius arquata displaced by wind energy developments? Natural Research Projects Ltd, Banchory

[18] Devereux, C.L., Denny, M.J.H. and Whittingham, M.J. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds, Journal of Applied Ecology 45: 1689-1694

[19] Drewitt, A.L. and Langston, R.L.H. 2006. Assessing the impacts of wind farms on birds, Ibis 148: 29-42

[20] Masden, E. A., Haydon, D. T., Fox., A.D. and Furness, R.W. (2010) Barriers to movement: Modelling energetic costs of avoiding marine wind farms amongst breeding seabirds. *Marine Pollution Bulletin*, Vol. 60, issue 7: 1085-1091.

Mitigation

9.100 In light of the overall negligible effects predicted as a result of the Proposed Wind Farm Development, there are no specific mitigation requirements. Good practice measures shall be implemented throughout to ensure consideration of birds during all stages of the Proposed Wind Farm Development, and to maintain adherence with relevant nature conservation legislation – these will be delivered through a Breeding Bird Protection Plan, which will be included in the final Construction and Decommissioning Method Statement.

Mitigation during Construction

9.101 A Breeding Bird Protection Plan (BBPP) will be produced, and will be approved by the planning authority in consultation with SNH prior to implementation. The BBPP will detail the procedures to be followed to ensure reasonable precautions are taken to avoid disturbance to breeding birds on the Site (with specific reference to Golden Plovers). Likely measures may include, but will not be limited to, appropriate buffer distances from golden plover nest sites and monitoring.

Mitigation during Operation

9.102 The implementation of a Habitat Management Plan (HMP) for the purposes of enhancing blanket bog habitat in areas of the Site (see **Chapter 8: Ecology**, **Technical Appendix 8.7**), will also serve to provide improved conditions for breeding Golden Plover. This will be manifested through the increased cranefly abundance, which is a key prey species of Golden Plover, and whose abundance is closely linked to the water level within blanket bog habitat; Coulsen (1962 in Pearce-Higgins 2011[21]) found that the desiccation of the peat surface results in a high mortality of early cranefly larvae instars. During the breeding season, the growth and survival of young chicks is positively correlated with the abundance of emerged craneflies (Pearce-Higgins & Yalden 2004 in Pearce-Higgins 2011[21]), and therefore the management of these areas to restore bog conditions will also improve conditions for breeding Golden Plovers.

Assessment of Residual Impacts

9.103 The assessment is applied to those populations which have been scoped in and are of Moderate and High Nature Conservation Importance as defined within **Table 9.6**. Relevant Conservation Status information is detailed within **Table 9.7**.

9.104 Nature Conservation Importance of recorded birds is summarised in **Table 9.6**, with relevant Conservation Status information detailed within **Table 9.7**.

[21] Pearce-Higgins, J. W. (2011). Modelling conservation management options for a southern range-margin population of Golden Plover Pluvialis apricaria vulnerable to climate change. Ibis (2011), 153, 345–356

Table 9.6: Nature Conservation Importance of Target Species recorded within the Site (excluding those scoped out)		
Species	**Conservation Importance**	**Reason**
Greylag Goose	High	SPA qualifying breeding species Moray and Nairn Coast SPA.
Pink-footed Goose	High	SPA qualifying breeding species Moray and Nairn Coast SPA.
Black Grouse	Moderate	Red List
Golden Plover	Moderate	Annex 1
Short-eared Owl	Moderate	Annex 1

Table 9.7. Conservation Status of Target Species Populations Recorded (excluding those scoped out).[22]		
Target Species	**Conservation Status**	**Recent Population Trend**
Greylag Goose	Amber List	About 30,000 birds are present in Scotland during the breeding season, with the majority of these in NW Scotland where the species is native. A smaller number breed in areas of east, central, and southern Scotland where the species has been naturalised. The breeding numbers in Scotland have been increasing rapidly (a rate of around 12% per annum) over recent decades. Some 85,000 birds arrive in autumn from breeding grounds in Iceland, and mainly occupy low lying agricultural land in eastern Scotland. The wintering numbers arriving from Iceland had increased up to 1990, but have since declined due to intensive shooting in Iceland. Distribution of those wintering birds has also changed, with a dramatically increased proportion wintering in the northern isles (especially Orkney) and few now moving as far south as the central belt of Scotland or southern Scotland. The Moray and Nairn coast SPA designated population is 3,023 birds, which is classed as 'favourable maintained' (SNH, 30/11/2008).
Pink-footed Goose	Amber List	This species breeds mainly in Iceland, and those birds winter in Britain. About 200,000 are in Scotland in October (this is 66% of the world population), decreasing to around 100,000-150,000 in winter. Numbers of this species have been increasing, and the Scottish wintering **population** doubled between 1960 and 1980, and doubled again from 1980 to 2000. The species is Amber listed because a very high proportion of the world population winters in Britain. The Moray and Nairn coast SPA designated population is 7,538 birds, which is classed as 'favourable maintained' (SNH, 30/11/2008).
Black Grouse	Red List	Breeding numbers in the UK declined by 80% between 1991 and 2004. Sim et al. (2008[23]) estimated there to be 5,078 male Black Grouse in the UK, with approximately two-thirds of these occurring in Scotland. However, Forrester et al. (200711) estimate that in Scotland there are now around 3,550 to 5,750 lekking males, representing about 71% of the British population. In Scotland the breeding range is contracting and numbers are declining, though the rate of decline varies regionally, being highest in southern Scotland.
Golden Plover	Amber List	About 15,000 pairs (80% of British breeding population) breed in Scotland. Passage numbers are 10,000-30,000 in spring, 20,000-60,000 in autumn, and 25,000-35,000 winter in Scotland (Forrester et al. 2007[14]). There is no clear trend in numbers in Scotland, although the population may have declined in some areas, including North-east Scotland, and in areas with extensive plantation afforestation on moorland (Forrester et al. 2007[14]). The Highlands of Scotland represent the core area of breeding distribution for this species in the UK (Forrester et al. 2007[14]). Pearce-Higgins *et al*. (2008[24]) estimate the NHZ 10 population at 360 pairs. The breeding bird survey (BBS) index for golden plover in the UK indicated a 2% increase between 1994 and 2004 whereas in Scotland over the same period the index declined by 3%, but neither change was statistically significant. These data indicate that the breeding population of golden plover in Scotland and in GB as a whole can be considered as in favourable conservation status.
Short-eared Owl	Amber List	Accurate estimates of population size and trends over large scales are difficult for this nomadic species whose distribution and abundance are strongly linked to food availability. In 1988-91 the British population was estimated at between 1,000 and 3,500 pairs (Gibbons et al. 1993[25]). Birds of Scotland (Forrester et al. 2007[14]) estimates the Scottish population at between 780 and 2,700 in 2000, or by extrapolating from data collected in Lothian and Borders between 1988-94 (which the authors regarded – probably correctly – as being more accurate) (Murray et al. 1998), at somewhere between 250 and 1,250 pairs. The short-eared owl is Amber listed as it is a SPEC species (Eaton et al. 20097), but there is little clear evidence of a long-term decline in breeding numbers at the GB level because numbers fluctuate and have not been censused accurately at a national scale. Forrester et al. (2007[14]) suggest that there have been declines in Scotland, with reduced breeding numbers in the Borders in the mid-1990s and in Aberdeenshire since 1968-72. The two BTO breeding bird atlases suggest a 15% decline in breeding numbers in Scotland between 1968-72 and 1988-91. However, these trends need to be considered in the context of changes in breeding numbers by up to a factor of ten between years with high and low vole population densities (Forrester et al. 2007[14]). It is difficult to assess whether or not this species is currently in favourable conservation status. It is likely to be affected in some areas by persecution and by habitat change, and may benefit in the same way as the Hen Harrier from reduced densities of sheep on Scottish hill land.

[22] Data from Eaton et al. (2009) Birds of Conservation Concern. British Birds 102: 296-341 (Langston 2003), Forrester et al. (2007), and SNH Site Link V3.

[23] Sim, I.M.W., Eaton, M.A., Setchfield, R.P., Warren, P.K. and Lindley, P. 2008. Abundance of male black grouse Tetrao tetrix in Britain in 2005, and change since 1995-96. Bird Study 55: 304-313.

[24] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W. & Bright, J.A. (2008): Assessing the cumulative impacts of wind farms on peatland birds: a case study of golden plover *Pluvialis apricaria* in Scotland. Mires and Peat 4: Art. 1.

[25] Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991. T. & A.D. Poyser, London.

Construction and Decommissioning Impacts

Greylag Goose

9.105 Greylag Goose effects shall be considered within the context of the Moray and Nairn Coast SPA.

9.106 With regards to the Habitats Regulations Appraisal method detailed in paragraph 9.21, the Proposed Wind Farm Development is not directly connected to, or necessary for, the management of the Moray and Nairn Coast SPA (Step 1); Step 2 requires an assessment of whether there is potential for a likely significant effect, either alone or in combination, on the SPA. If there is potential for a likely significant effect, Step 3 would require an Appropriate Assessment to be undertaken by the competent authority of the implications for the SPA in view of the conservation objectives. This chapter provides information to inform the screening stage (Stage 2) on whether there is potential for a likely significant effect either alone or in combination. The information presented here may also inform an Appropriate Assessment should SNH advise the Scottish Ministers that this is required.

9.107 To establish the impact of the Proposed Wind Farm Development on the integrity of an SPA, it is necessary to consider the relevant conservation objectives which may be affected. The conservation objectives for the Moray and Nairn Coast SPA are as follows:

9.108 In light of the Site's relative proximity to the SPA, conservation objectives 1, 2a and 2e are considered relevant. Conservation objectives 2b, 2c and 2d are not relevant and are therefore scoped out of the HRA:

- (1) To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- (2) To ensure for the qualifying species that the following are maintained in the long term:
  - (a) Population of the species as a viable component of the SPA;
  - (b) Distribution of the species within site (scoped out);
  - (c) Distribution and extent of habitats supporting the species (scoped out);
  - (d) Structure, function and supporting processes of habitats supporting the species (scoped out); and
  - (e) No significant disturbance of the species.

9.109 Effect – Flight Activity Displacement (All relevant conservation objectives apply): See paragraph 9.85.

9.110 Nature Conservation Importance: Due to their association with the Moray and Nairn Coast SPA, the non-breeding population of Greylag Geese is classified as **High** Nature Conservation Importance (Table 9.6). At a regional level (i.e. within NHZ 10) the species is not considered to be of greater than Low Nature Conservation Importance (Table 9.6).

9.111 Conservation Status: Non-breeding (Icelandic) Greylag Geese numbers in Scotland have fluctuated and currently number ca. 85,000 birds, the majority of which remain in Orkney for the duration of the winter. The conservation status of the Scottish population is therefore considered to be favourable.

9.112 SPA Conservation Status: At the Moray and Nairn Coast SPA, the Conservation Status of this notified species was listed as 'Favourable, maintained' (on 30/11/2008, SNH). The designated population is 3,023 birds (SNH 1995).

9.113 Magnitude of Effect: For the purposes of this assessment, the effect magnitude is considered within the context of the Moray and Nairn Coast SPA. The Site is around 16 km from the Moray and Nairn Coast SPA thus is within the maximum SPA connectivity distance for the species (as described within SNH (2012)). It is considered unlikely that these birds are associated with this SPA, by virtue of the distance of the Site from the SPA and the relative lack of suitable foraging habitat in the vicinity of the Site (that would warrant the energy expense of regular flights from the SPA). Even with the application of the precautionary principle (and assuming that SPA birds are displaced from overflying the Site during construction), the relatively small area to be affected (a maximum east-west width of ca. 1.5 km) together with the lack of constraints to flight within the wider area and the fact that displacement effects will last for 28 months (a maximum of three full non-breeding seasons) the predicted magnitude of effect of construction is considered to be **Negligible** spatial and **Short Term** temporal for the Moray and Nairn Coast SPA.

9.114 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Pink-footed Goose

9.115 With regards to the Habitats Regulations Appraisal method detailed in paragraph 9.21, the Proposed Wind Farm Development is not directly connected to, or necessary for, the management of the Moray and Nairn Coast SPA (Step 1); Step 2 requires an assessment of whether there is potential for a likely significant effect, either alone or in combination, on the SPA. If there is potential for a likely significant effect, Step 3 would require an Appropriate Assessment to be undertaken by the competent authority of the implications for the SPA in view of the conservation objectives. This chapter provides information to inform the screening stage (Stage 2) on whether there is potential for a likely significant effect either alone or in combination. The information presented here may also inform an Appropriate Assessment should SNH advise the Scottish Ministers that this is required.

9.116 As with Greylag Goose, Conservation objectives 1, 2a and 2e are relevant here.

9.117 *Effect – Flight Activity Displacement:* See paragraph 9.86.

9.118 *Nature Conservation Importance*: Due to their association with Moray and Nairn Coast SPA, the non-breeding population of Pink-footed Geese is classified as **High** Nature Conservation Importance (Table 9.6). At a regional level (i.e. within NHZ 10) the species is not considered to be of greater than Low Nature Conservation Importance (Table 9.6).

9.119 *Conservation Status*: Non-breeding Pink-footed Goose numbers in Scotland have increased significantly over the past 50 years, with a 300% increase numbers recorded between 1960 and 2000. The species currently numbers up to 200,000 birds in winter, with the conservation status of the Scottish population considered to be favourable.

9.120 At the Moray and Nairn Coast SPA, the Conservation Status of this notified species was listed as *'Favourable, maintained'* (on 30/11/2008, SNH). The designated population is 7,538 birds (SNH 1995), which represents 4% of the total population.

9.121 *Magnitude of Effect*: For the purposes of this assessment, the effect magnitude is considered within the context of the Moray and Nairn Coast SPA population. The Site is around 16 km from the Moray and Nairn Coast SPA thus is within the maximum SPA connectivity distance for the species (as described within SNH (2012)). It is considered unlikely that these birds are associated with this SPA, by virtue of: the relative lack of flight activity across the season (only six flights were recorded, all of which occurred during the migration period (late-September until early October); the distance of the Site from the SPA; and the relative lack of suitable foraging habitat in the vicinity of the Site (that would warrant the energy expense of regular flights from the SPA). Even with the application of the precautionary principle (and assuming that SPA birds are displaced from overflying the Site during construction), the relatively small area to be affected (a maximum east-west width of ca. 1.5 km) together with the lack of constraints to flight within the wider area and the fact that displacement effects will last for 28 months (a maximum of three full non-breeding seasons) the predicted magnitude of effect of construction is considered to be **Negligible** spatial and **Short Term** temporal for both the Moray and Nairn Coast SPA.

9.122 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Black Grouse

9.123 *Effect*: See paragraph 9.87.

9.124 *Nature Conservation Importance:* The species is listed on the BOCC red list, and is considered to be of **Moderate** Nature Conservation Importance.

9.125 *Conservation Status:* Moderate & Unfavourable-declining.

9.126 *Magnitude of Effect:* Bright et al. (2008[26]) assessed the likely sensitivity of Black Grouse to population level impacts of wind farms as 'moderate', based on Black Grouse research reported in Johnstone (1969[27]), Cayford (1993[28]), Anon (2003[29]) and Warren and Baines (2004[30]), although none of those studies involved studies of the species at wind farms. Direct study of Black grouse at wind farms indicated that Black Grouse behaviours show no obvious signs of being affected by wind farm construction disturbance, but that the amount of time birds spend attending leks may decline (Zeiler and Berger 2004[31]). In addition, Zeiler and Grünschachner-Berger (2009[32]) reported cases of collision mortality, and strong declines in Black Grouse numbers in local populations in areas where three wind farms were constructed in the Alpine zone in Austria. In a follow-up study at one of the same locations, Grünschachner-Berger and Kainer (2011[33]) reported that Black Grouse strongly avoided using the area within a wind farm, but in winter did feed on ground nearby that was heavily disturbed by activities on a ski run.

9.127 It is possible that foraging Black Grouse will be displaced from within the Site during construction. Three foraging females were recorded during surveys, from within ca. 100 m of proposed Site infrastructure. Because the lek was 1.8 km away from the Site construction is unlikely to disturb breeding activity at this lek site. Given the relative suitability of available foraging habitat within the wider area, and when considering the BBPP measures as detailed within paragraph 9.101 this potential displacement effect is considered to be of a magnitude that is **Negligible** spatial and temporal.

9.128 *Significance of Effect*: The effect is therefore assessed as **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Golden Plover

9.129 *Effect*: See paragraph 9.89.

9.130 *Nature Conservation Importance*: The Site population of this species is not associated with any SPA. The species is listed on Annex 1 of the Birds Directive, and is considered to be of **Moderate** Nature Conservation Importance.

9.131 *Conservation Status*: Favourable.

9.132 *Magnitude of Effect*: It is possible that three Golden Plover nest sites will be disturbed during construction, given their relative proximity to turbines. Disturbance to the remaining three territories recorded at the Site is expected to be negligible by virtue of the distance of the territories from the construction activities. Assuming the birds are not re-distributed across the Site or wider area during construction (as is most likely), the potential 'loss' (of three breeding pairs during the construction phase) represents around 0.02% of the Scottish population, and is clearly not an effect that will jeopardise the species' conservation status (a consideration of which is required given the species' Annex 1 status (SNH 2011)). At the NHZ level, this loss represents ca. 0.83% of the population. When considering the temporary

[26] Bright, J., Langston, R., Bullman, R., Evans, R., Gardner, S. and Pearce-Higgins, J. 2008. Map of bird sensitivities to Wind farms in Scotland: A tool to aid planning and conservation. Biological Conservation 141: 2342-2356.

[27] Johnstone, G.W., 1969. Ecology, dispersion and arena behaviour of Black Grouse (Lyrurys tetrix L.) in Glen Dye, N.E. Scotland. Ph.D. thesis, University of Aberdeen.

[28] Cayford, J.T. 1993. Black grouse and forestry: Habitat requirements and management. Forestry Commission Technical Paper 1, Edinburgh.

[29] Anon, 2003. Black Grouse Species Action Plan. UK Biodiversity Group Tranche 2 Action Plans – Volume VI: Terrestrial and Freshwater Species and Habitats, October 1999, Tranche 2, vol. VI, p. 17.

[30] Warren, P. and Baines, D., 2004. Black Grouse in northern England: stemming the decline. British Birds 97: 183–189.

[31] Zeiler, H and Berger, V 2004 Windfarm extensions, a risk for wild animals. Unpublished report.

[32] Zeiler, H.P. and Grünschachner-Berger, V. 2009. Impact of wind power plants on black grouse, Lyrurus tetrix in Alpine regions. Folia Zoologica 58: 173-182.

[33] Grünschachner-Berger, V. and Kainer, M. 2011. Black grouse Tetrao tetrix (Linnaeus 1758): How to live between skiing areas and windparks. Egretta 52: 46-54.

nature of this 'loss', together with an appreciation of the mitigation measures as described within paragraph 9.100 onwards (appropriate construction buffers from golden plover nest sites), the magnitude of this effect is considered to be no greater than **Low** spatial and **Short-term**.

9.133 *Significance of Effect*: The effect is therefore assessed as **Minor** and **Not Significant** under the terms of the EIA Regulations.

Short-eared Owl

9.134 *Effect*: See paragraph 9.90.

9.135 *Nature Conservation Importance:* The species is listed on Annex 1 of the Birds Directive and on the BOCC amber list, and is considered to be of **Moderate** Nature Conservation Importance.

9.136 Conservation Status: Moderate & Stable.

9.137 *Magnitude of Effect:* It is possible that foraging Short-eared Owl will be displaced from within the Site during construction. Four foraging birds were recorded during surveys, two of which were foraging across proposed Site infrastructure. Given the relative suitability of available foraging habitat within the wider area and that no nest site has been recorded within 2 km of the Site (which is considered to be their core territory), this potential displacement effect is considered to be of a magnitude that is **Low** spatial and **Short-Term** temporal.

9.138 Significance of Effect: The effect is therefore assessed as **Minor** and **Not Significant** under the terms of the EIA Regulations.

Operational Impacts

Bird Collision Mortality Risks

9.139 For full Collision Risk modelling methods and references, see **Technical Appendix 9.1 Annex E**.

9.140 For the avoidance of repetition, reference is made to previous paragraphs with regards to the Nature Conservation Importance and Conservation Status of the various Target Species.

9.141 The weighted mortality estimate from the CRM is used within the following paragraphs.

9.142 The considerations with regard to the Habitats Regulations Appraisal detailed from paragraph 9.21 onwards also apply here to operational effects on Greylag Goose and Pink-footed Goose.

Greylag Goose (non-breeding)

9.143 Greylag Goose effects shall be considered within the context of the Moray and Nairn Coast SPA.

9.144 With regards to the Habitats Regulations Appraisal method detailed in paragraph 9.21, the Proposed Wind Farm Development is not directly connected to, or necessary for, the management of the Moray and Nairn Coast SPA (Step 1); Step 2 requires an assessment of whether there is potential for a likely significant effect, either alone or in combination, on the SPA. If there is potential for a likely significant effect, Step 3 would require an Appropriate Assessment to be undertaken by the competent authority of the implications for the SPA in view of the conservation objectives. This chapter provides information to inform the screening stage (Stage 2) on whether there is potential for a likely significant effect either alone or in combination. The information presented here may also inform an Appropriate Assessment should SNH advise the Scottish Ministers that this is required.

9.145 Conservation objectives 1 and 2a are relevant to potential Collision Risk Mortality for the Moray and Nairn Coast SPA.

- (1) To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- (2) To ensure for the qualifying species that the following are maintained in the long term:
  - (a) Population of the species as a viable component of the SPA;

9.146 *Effect*: See paragraph 9.91.

9.147 Details of collision modelling data and calculations are in the **Appendix 9.1, Annex E.**

9.148 *Nature Conservation Importance and relevant Conservation Status*: High and Favourable Maintained (see paragraphs 0 and 9.111).

9.149 *Magnitude of Effect*: The Moray and Nairn Coast SPA Greylag Goose population was designated at 3,023 birds (SNH 1995[34]). This loss therefore represents a 0.012% population loss during a single year. When considering the loss to this population of ca. 605 birds to natural annual mortality (assuming grey geese populations have an average mortality rates of around 20% per annum[35]), the additional mortality rate due to the Proposed Wind Farm Development is 0.06%. This effect is of negligible significance in terms of the added population mortality. The effect is therefore considered to be of **Long-Term** Temporal and **Negligible** Spatial magnitude at the population level.

9.150 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Pink-footed Goose (non-breeding)

9.151 With regards to the Habitats Regulations Appraisal method detailed in paragraph 9.21, the Proposed Wind Farm Development is not directly connected to, or necessary for, the management of the Moray and Nairn Coast SPA (Step 1); Step 2 requires an assessment of whether there is potential for a likely significant effect, either alone or in combination, on the SPA. If there is potential for a likely significant effect, Step 3 would require an

[34] SNH (1995) Special Protection Area Citation for Public Issue: Moray Basin Firths and Bays, Highland and Grampian (162) 5: Moray and Nairn Coast, Highland and Grampian (162E). Accessed via: SNHi Sitelink.

[35] Madsen, J.M., Frederiksen, M. and Ganter, B. 2002. Trends in annual and seasonal survival of pink-footed geese *Anser brachyrhynchus*, Ibis 144: 218-226

Appropriate Assessment to be undertaken by the competent authority of the implications for the SPA in view of the conservation objectives. This chapter provides information to inform the screening stage (Stage 2) on whether there is potential for a likely significant effect either alone or in combination. The information presented here may also inform an Appropriate Assessment should SNH advise the Scottish Ministers that this is required. Conservation objectives 1 and 2a are relevant to Collision Risk Mortality for Moray and Nairn Coast SPA (see Paragraph 9.145).

9.152 *Effect*: See paragraph 9.92.

9.153 Details of collision modelling data and calculations are in detailed Technical **Appendix 9.1, Annex E.**

9.154 *Nature Conservation Importance and relevant Conservation Status*: High and Favourable Maintained (see paragraph 9.118 and 9.119).

9.155 *Magnitude of Effect*: The Moray and Nairn Coast SPA Greylag Goose population was designated at 7,538 birds (SNH 1995[34]). This loss therefore represents a 0.011% population loss during a single year. When considering the loss to this population of ca. 1,508 birds to natural annual mortality (grey geese have adult mortality rates of around 20% per annum[36]), the additional mortality rate due to the Proposed Wind Farm Development is 0.06%. This effect is of negligible significance in terms of the added population mortality. The effect is therefore considered to be of **Long-Term** Temporal and **Negligible** Spatial magnitude at the population level.

9.156 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Short-eared Owl

9.157 *Effect*: See paragraph 9.93.

9.158 Nature Conservation Importance and relevant Conservation Status: Moderate and stable.

9.159 *Magnitude of Effect*: The predicted loss due to the wind farm is equivalent to 0.001% of the Scottish population (estimated average of 1,500 birds, see **Technical Appendix 9.1 Table 9**). The effect magnitude is therefore **Negligible** spatial and temporal.

9.160 *Significance of Effect*: The effect is classified as **Negligible** and is therefore **Not Significant** under the terms of the EIA Regulations.

Displacement Effects

9.161 The displacement of nesting and foraging birds from the Site has the potential to extend beyond the construction phase, as described above, and to occur during the operational phase of the Proposed Wind Farm Development. Lower levels of disturbance will be expected during operation compared with construction which suggests that displacement effects will be less than those assessed for the construction. Displacement from operational turbines has been recorded in a number of studies conducted at wind farms, generally over distances of up to 100 m or 200 m from turbines, although the effects vary considerably between sites and species (Pearce-Higgins et al. 2009[40] and 2012[36]). Additional existing information (e.g. Whitfield et al. 2010[37]) suggests that these effects are minimal, with most species affected only slightly, if at all, whilst Drewitt and Langston (2006[19]) highlighted the need for further study in order to accurately quantify displacement effects. Devereux et al. (2008[38]) showed that wind farms had no, or at most a minimal, effect on the local distribution of wintering farmland birds.

9.162 Those studies mentioned above were focused on direct displacement (i.e. avoidance of areas surrounding wind farm installations); an additional consideration is the displacement of birds from larger areas where the turbines act as a barrier to bird movement. The likelihood of this effect occurring tends to increase with wind farm size, where large turbine arrays can force birds to alter their regular flight-paths, resulting in an increase in distance flown and so energy expended. However, a review of the literature suggests that none of the barrier effects identified so far have significant effects on populations (Drewitt and Langston 2006[39]). This was also the conclusion from modelling of potential increases in energy expenditure on those bird species most likely to be sensitive to barrier effects (large and long-lived breeding birds such as seabirds) by Masden et al. (2010[20]). Pearce-Higgins et al. (2009[40]) also observed that certain species experienced localised population increases in proximity to wind farm installations, presumably due to the introduction of new structures into the habitat. Thus the effects of wind farm presence on local bird populations can be either negative or positive.

Greylag Goose (non-breeding)

9.163 *Effect – Flight Activity Displacement:* See paragraph 9.96.

9.164 *Nature Conservation Importance and relevant Conservation Status*: see paragraphs 0 and 9.111.

9.165 *Magnitude of Effect*: For the purposes of this assessment, the effect magnitude is considered within the context of the Moray and Nairn Coast SPA population.

9.166 The relevant conservation objectives in this regard are 1 and 2a and 2e (see paragraph 9.108).

9.167 *Flight Activity Displacement:* Although the temporal magnitude of the potential effect is **Long Term**, the spatial magnitude is considered to be **Negligible** due to the limited extent of the Proposed Wind Farm Development, the ease with which it can be avoided and the abundance of flight activity recorded from outwith the site (suggesting no constraints to bird movement within the immediate vicinity of the Proposed Wind Farm Development). No geese

[36] Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R.H.W. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49: 386-394

[37] Whitfield, D.P., Green, M. and Fielding, M.H. 2010. Are breeding curlew Numenius arquata displaced by wind energy developments? Natural Research Projects Ltd, Banchory

[38] Devereux, C.L., Denny, M.J.H. and Whittingham, M.J. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds, Journal of Applied Ecology 45: 1689-1694

[39] Drewitt, A.L. and Langston, R.L.H. 2006. Assessing the impacts of wind farms on birds, Ibis 148: 29-42

landed on the Site, and so there will be no loss of foraging habitat for geese. Small numbers of geese flying through the area at relatively low height may possibly increase their flight time to fly around the Proposed Wind Farm Development, but such an effect is likely to be trivial in the context of bird daily energy budgets (Masden et al. 2010[20]). The above applies to both the two SPAs and wider countryside populations.

9.168 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Pink-footed Goose (non-breeding)

9.169 *Effect – Flight Activity Displacement:* See paragraph 9.97.

9.170 *Nature Conservation Importance and relevant Conservation Status*: see paragraphs 9.118 and 9.119.

9.171 *Magnitude of Effect*: For the purposes of this assessment, the effect magnitude is considered within the context of the Moray and Nairn Coast SPA population.

9.172 The relevant conservation objectives in this regard are 1, 2a and 2e (see paragraph 9.108).

9.173 *Flight Activity Displacement:* Although the temporal magnitude of the potential effect is **Long Term**, the spatial magnitude is considered to be **Negligible** due to the limited extent of the Proposed Wind Farm Development, the ease with which it can be avoided and the abundance of flight activity recorded from outwith the Site (suggesting no constraints to bird movement within the immediate vicinity of the Proposed Wind Farm Development). No geese landed on the Site, and so there will be no loss of foraging habitat for geese. Small numbers of geese flying through the area at relatively low height may possibly increase their flight time to fly around the Proposed Wind Farm Development, but such an effect is likely to be trivial in the context of bird daily energy budgets (Masden et al. 2010[20]). The above applies to both the SPA populations.

9.174 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Golden Plover

9.175 *Effect – Nest Site Displacement*: See paragraph 9.89.

9.176 *Nature Conservation Importance and Conservation Status:* see paragraph 9.130 and 9.131 onwards.

9.177 *Magnitude of Effect*: It is possible that three Golden Plover nest sites will be displaced by the Proposed Wind Farm Development, given their relative proximity to turbines (<ca.100m). Golden Plover displacement across wind farms has been subject to recent study, and it is has been demonstrated that their relative tolerance of such developments is manifested in a displacement distance around turbines that is less than was originally suggested (e.g. 200 m, Pearce-Higgins (2009[40])). Fielding and Howarth (2010[41]) found no clear trend of displacement of Golden Plover territories in response to turbine presence; indeed, pairs were observed at distances within 100 m of turbines. With the application of the precautionary principal, it is assumed that these breeding birds would not re-distribute elsewhere and will be lost from the population. This loss represents around 0.02% of the Scottish population, and is clearly not an effect that will jeopardise the species' conservation status. At the NHZ level, this loss represents around 0.083% of the population. Taken into account the favourable conservation status of the population and the proposed mitigation (Habitat Management Plan) the magnitude of this effect is considered to be no greater than **Low** spatial and **Long-Term** temporal.

9.178 *Significance of Effect*: The effect is therefore assessed as **Minor** and **Not Significant** under the terms of the EIA Regulations.

Short-eared Owl

9.179 *Effect - Foraging Displacement*: See paragraph 9.90.

9.180 *Nature Conservation Importance and relevant Conservation Status*: see paragraphs 9.135 and 9.136 onwards.

9.181 *Magnitude of Effect*: Short-eared Owl activity across the Site was low with only four flights recorded (with two of the four flights occurring ca. 10 m from proposed infrastructure) and is considered to be typical for the species within the wider area. It is unknown the extent to which the species is displaced from foraging by the presence of turbines and wind farm infrastructure, however it is considered that given the low levels of activity at present, coupled with the suitable foraging habitat within the immediate vicinity of the Site and further afield, the effect magnitude will be **Negligible** spatial and temporal.

9.182 *Significance of Effect – Foraging Displacement*: The effect is therefore assessed as *Negligible* and **Not Significant** under the terms of the EIA Regulations.

9.183 It is considered that all effects will be no greater than **Minor** significance under the terms of the EIA Regulations. **Table 9.8** below summarises this process.

Table 9.8 Summary of Significance of Effects

Potential Effect	Mitigation Proposed	Means of Implementation	Residual Effect
Construction			
Greylag Goose: Flight activity displacement Pink-footed Goose:	None	n/a	Negligible

[40] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P & Bullman, R. (2009). The distribution of breeding birds around upland wind farms. Journal of Applied Ecology 46: pp 1323-1331.

[41] Fielding, A. H. & Howarth, P. F. (2010). Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2009.

Table 9.8 Summary of Significance of Effects

Potential Effect	Mitigation Proposed	Means of Implementation	Residual Effect
Flight activity displacement	None		
Short-eared Owl: Foraging displacement	None	n/a	Negligible
Golden Plover (nesting)	Protection of nest sites during the breeding season; habitat management to improve conditions for Golden Plover	Breeding Bird Protection Plan (BBPP);	Minor
Black Grouse (foraging and lekking)	Protection of lek sites during construction.	Breeding Bird Protection Plan (BBPP)	Negligible
Operation			
Greylag Goose: Collision risk Displacement	None None	n/a	Negligible
Pink-footed Goose: Collision risk Displacement	None None	n/a	Negligible
Short-eared Owl: Collision risk Foraging displacement	None None	n/a	Negligible Negligible
Golden Plover: Displacement	Habitat Improvement	Blanket Bog HMP	Minor
Decommissioning			
Same as construction phase			

Summary of Effects upon Special Protection Area

9.184 In order that the cumulative effects of those likely significant effects as identified above can be assessed within the context of the conservation objectives of the relevant SPA, the following Table 9.9 summarises these effects.

Table 9.9 Cumulative Effects of Construction, Operation and Decommissioning of the Proposed Wind Farm Development on the Integrity of Moray and Nairn Coast SPA (Greylag Goose and Pink-footed Goose effects).

Stage	Effect	Mitigation	Residual Effect
Construction	Flight Activity Displacement	None	No likely significant effect
Operation	Collision Risk	None	No likely significant effect
	Flight Activity Displacement	None	No likely significant effect
Decommissioning – similar to construction			

9.185 When considering the above table and the assessment as detailed from paragraph 9.83 onwards, it is considered that the cumulative effects of the respective phases of the Proposed Wind Farm Development will have **No Likely Significant Effect** upon the integrity of the Moray and Nairn Coast SPA with respect to the site's conservation objectives.

Cumulatives

9.186 Short-eared Owl and Black Grouse are scoped out of the cumulative assessment in light of the minimal predicted effects on them arising from the Proposed Wind Farm Development. Therefore breeding Golden Plover, Greylag Goose and Pink-footed Goose are considered within the cumulative assessment below.

9.187 There are 13 wind farms (in varying stages from in planning to operation) located within 20 km of the Site. Through desk based searches it was possible to source six Environmental Statements. Where it was not possible to source the relevant site data, an average impact was calculated for these sites based on the following approach: For sites for which data was obtained, the average impact per turbine was calculated by summing all similar impacts at these sites and dividing this value by the total number of turbines at these sites. This impact value was then multiplied by the number of turbines at the sites where no data was obtained to gain an estimate of the likely impact at these sites. The assumption in this approach is that the six sites for which data was obtained (as well as Cairn Duhie) are representative of the impacts at the seven sites where no data was obtained. This is considered to be a sufficient assumption to base the cumulative and in combination assessment on.

Golden Plover – Cumulative Effects

9.188 The following table details the sites within 20 km of Cairn Duhie which are considered within the cumulative assessment. The shaded rows represent sites for which the ES could not be obtained and assumptions regarding the impact have been made.

Table 9.10 Cumulative Effects on breeding Golden Plover

Development Name	Number of Turbines	ES Obtained	No. of Golden Plover territories	Mitigation which would benefit for Golden Plover
Berryburn	29	Y	3 pairs located within 500m	Berryburn Habitat Management Plan includes measures to enhance the habitat for raptors and black grouse. Moorland management measures will also benefit golden plover (creation of shorter swards through cutting/burning).
Cairn Duhie	20	Y	3 within 200	Blanket bog enhancement will benefit golden plover.
Cairn Uish (Rothes 1)	22	Y	0 within 200m	Blanket bog management and forest clearance and moorland restoration which will benefit golden plover.
Hill of Glaschyle	12	Y	0	None noted.
Moy	20	Y	2 within 300m of turbines	Habitat Management Plan for blanket bog and raptors which may benefit plovers.
Tom na Clach	17	Y	7 in 2006 (4 within 250m); 24 in 2008 (12 within 250m). Average = 9.5	Management of areas of blanket bog and heath above the 500m contour, approximately 3.5km to the South of the proposed wind farm development site for the benefit of breeding golden plover.
Totals	**120 Turbines**		**17.5 Territories**	
Average Golden Plover territories Displacement per Turbine			**0.15 Territories**	
Logie Home Farm	1	N	Agricultural Land & Forestry.	
Bognie Farm	1	N	Agricultural Land & Forestry	
Cluny Farm	1	N	Agricultural Land & Forestry	
Findhorn	4	N	Coastal	
Kellas	8	N	1.17	
Paul's Hill Phase 1 & 2	28	N	4.08	
Rothes 2	18	N	Not obtained (but within forest so not relevant for golden plover)	
Total Territories lost assuming no mitigation			22.75	

9.189 *Nature Conservation Importance and Conservation Status:* see paragraph 9.130 and 9.131 onwards.

9.190 *Magnitude of Effect*: It is possible that 22.75 Golden Plover nest sites will be potentially displaced by all the wind farms considered in the cumulative assessment. The loss of 22.75 pairs represents a loss of around 0.15% of the Scottish population. At the NHZ level, this loss represents around 6.32% of the regional population. 6.32% is considered to be a potentially moderate significant effect on the regional population however, taking into account the favourable conservation status of the population and that mitigation is proposed at all the above schemes that have been predicted to have an impact, the residual magnitude of this effect is considered to be **Low** spatial and **Long-Term** temporal.

9.191 *Significance of Effect*: The effect is therefore assessed as **Minor** and **Not Significant** under the terms of the EIA Regulations.

In Combination Effects – Moray and Nairn Coast SPA

9.192 With regards to the Habitats Regulations Appraisal method detailed in paragraph 9.21, the Proposed Wind Farm Development is not directly connected to, or necessary for, the management of the Moray and Nairn Coast SPA (Step 1); Step 2 requires an assessment of whether there is potential for a likely significant effect, either alone or in combination, on the SPA. If there is potential for a likely significant effect, Step 3 would require an Appropriate Assessment to be undertaken by the competent authority of the implications for the SPA in view of the conservation objectives. This chapter provides information to inform the screening stage (Stage 2) on whether there is potential for a likely significant effect either alone or in combination. The information presented here may also inform an Appropriate Assessment should SNH advise the Scottish Ministers that this is required.

9.193 To establish the in combination impact of the Proposed Wind Farm Development along with other relevant developments on the integrity of an SPA, it is necessary to consider the relevant conservation objectives which may be affected. The conservation objectives for the Moray and Nairn Coast SPA are as follows:

9.194 Collision risk is the relevant impact to assess at the in combination level, conservation objectives 1, 2a and 2e are considered relevant with regards to this. Conservation objectives 2b, 2c and 2d are not relevant and are therefore scoped out of the HRA:

- (1) To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- (2) To ensure for the qualifying species that the following are maintained in the long term:
  - (a) Population of the species as a viable component of the SPA;
  - (b) Distribution of the species within site (scoped out);
  - (c) Distribution and extent of habitats supporting the species (scoped out);

- (d) Structure, function and supporting processes of habitats supporting the species (scoped out); and
- (e) No significant disturbance of the species.

9.195 Effect (Collision Mortality): See paragraph 9.85 and 9.92.

9.196 In combination collision risk upon Greylag and Pink-footed Goose are assessed detailed within the following table. The shaded rows represent sites for which the ES could not be obtained and assumptions regarding the impact have been made.

Table 9.11 In Combination Effects on Greylag and Pink-footed Geese

Development Name	Number of Turbines	ES Obtained	Collision Mortality Estimate for Greylag	Collision Mortality Estimate for Pink-footed Geese
Berryburn	29	Y	0	0
Cairn Duhie	20	Y	0.38 per annum based on 99.8%	0.85 per annum based on 99.8%
Cairn Uish (Rothes 1)	22	Y	0	0
Hill of Glaschyle	12	Y	0	0
Moy	20	Y	0	0
Rothes 2	18	Summary obtained	0	0.3
Tom na Clach	17	Y	0.04 per annum based on 99% avoidance	0
Totals	**138**		**0.42**	**1.15**
Average annual collision mortality per turbine			**0.003**	**0.008**
Logie Home Farm	1	N	Excluded due to small size and lower elevation.	
Bognie Farm	1	N	0.003	0.008
Cluny Farm	1	N	0.003	0.008
Findhorn	4	N	0.012	0.033
Kellas	8	N	0.024	0.067
Paul's Hill Phase 1 & 2	28	N	0.085	0.233
Total In-Combination Collision Mortality per Annum			**0.548**	**1.500**

9.197 Cumulative collision risk estimates of 0.55 and 1.5 collisions per annum for Greylag and Pink-footed Goose are estimated. These estimates are considered to be precautionary as they are based on the old 99% avoidance rate for Tom na Clach and Rothes 2 (which has subsequently been changed to 99.8%).

9.198 1.5 Pink-footed Goose collisions per year represent a 0.02% loss to the SPA population during a single year. When considering the annual loss to this population of ca. 1,508 birds to natural annual mortality (grey geese have adult mortality rates of around 20% per annum (Masden et al. 2010), the additional mortality rate due to the Proposed Wind Farm Development is 0.099%. The effect is therefore considered to be of **Negligible** Spatial and **Long-Term** Temporal magnitude and **not significant** under the terms of the Habitats Regulations.

9.199 0.55 Grey-lag Goose collisions per year represent a 0.018% loss to the SPA population during a single year. When considering the annual loss to this population of ca. 604.6 birds to natural annual mortality (grey geese have adult mortality rates of around 20% per annum (Masden et al. 2010), the additional mortality rate due to the Proposed Wind Farm Development is 0.091%. The effect is therefore considered to be of **Negligible** Spatial and **Long-Term** Temporal magnitude.

9.200 In light of the above information it is considered that there is **no likely Significant Effect** predicted on the integrity of Moray and Nairn Cast SPA and an appropriate assessment is therefore not required.

Summary

9.201 When considering the assessment detailed above and summarised within **Table 9.8 and 9.9** it is considered that the potential impacts of the Proposed Wind Farm Development on the ornithology resources with the study area will be **not Significant** under the terms of the EIA Regulations and not likely to have a significant effect on the integrity of Moray and Narin Coast SPA under the Habitats Regulations.

10 Cultural Heritage and Archaeology

Introduction

10.1 This chapter considers the potential impacts of the Proposed Wind Farm Development on cultural heritage and archaeology (hereafter referred to as heritage assets). It details the results of a desk-based assessment and reconnaissance field survey carried out for the Site (Figure 10.1). The assessment was undertaken by CFA Archaeology Ltd, using information and advice provided by Historic Scotland (HS), THC Historic Environment Team (THCHET) and the Aberdeenshire Council Archaeologist (who acts as advisor to Moray Council).

10.2 This assessment was conducted in accordance with the Institute for Archaeologists Code of Conduct (IfA 2012)[1], Standard and Guidance for Archaeological Desk-based Assessment (2012)[2] and the Highland Council Standards for Archaeological Work (2012)[3].

10.3 The specific objectives of the study were to:

- identify the cultural heritage baseline within and in the vicinity of the Proposed Wind Farm Development;
- assess the Site of the Proposed Wind Farm Development in terms of its archaeological potential;
- consider the potential and predicted impacts of the construction, operation and decommissioning of the Proposed Wind Farm Development on the baseline historic environment resource, within the context of relevant legislation and planning guidance;
- propose measures, where appropriate, to mitigate any significant adverse impacts; and
- consider the cumulative impacts of the Proposed Wind Farm Development in combination with other existing or proposed developments, upon cultural heritage resources.

10.4 In order to achieve these objectives a three-tier, nested study area approach was used to reflect the varying nature of possible effects on heritage assets which could result from the Proposed Wind Farm Development.

i. The potential for direct impacts upon heritage assets has been considered within the Site, as illustrated on Figure 10.1. This figure also shows the layout of the Proposed Wind Farm Development. A gazetteer of the heritage assets identified within the Site is provided in **Technical Appendix 10.1**.

ii. The consideration of potential indirect impacts upon the setting of cultural heritage assets uses a 10 km radius study area (extending from the outermost turbines of the Proposed Wind Farm Development) as proposed in the Scoping Report. Where specific assets beyond 10 km were identified, either by statutory consultees, or through preliminary assessment of the 35 km ZTV as requiring consideration in the assessment, these have been included. Figure 10.2 shows the Proposed Wind Farm Development, together with its zone of theoretical visibility (ZTV), and the location of heritage assets within the 10 km radius which have a theoretical view of the turbines. A list of these heritage assets is provided in **Technical Appendix 10.2**. Consideration of Category C Listed Buildings is restricted to a 5 km radius study area, as these buildings are generally minor vernacular building types of the local historic environment, with localised settings. The potential impacts of the Proposed Wind Farm Development on the settings of heritage assets are considered as its presence could affect their historic environmental values. **Chapter 7: Landscape and Visual** deals with these sites in terms of their current character, and the visual amenity of the landscape from the perspective of residential receptors and visitors.

iii. Consultation identified several heritage assets which required particular consideration. Visualisations were used to aid in the assessment of the potential indirect impacts upon the settings of these sites, these visualisations are presented as Figures 10.4-10.9; two figures from the LVIA Assessment (Viewpoint 6 Ardclach Bell Tower, Figure 7.18 & Viewpoint 11 Carn nan Gabhar above Lochindorb, Figure 7.23) were also used to aid in the assessment. The locations from which each of these visualisations is taken are also shown on Figure 10.2

iv. The consideration of potential cumulative impacts upon the setting of heritage assets also uses a 10 km radius study area (extending from the outermost turbines of the Proposed Wind Farm Development). Figure 10.3 shows the Proposed Wind Farm Development, its ZTV, the locations of other wind farms within the 10 km radius (operational, under construction, consented, appeal / public inquiry and application submitted schemes are all included), and the locations of heritage assets which are predicted to have views of the Proposed Wind Farm Development. Consultation identified one site outwith this area (Burghead, fort, graveyard and chapel, including the Clavie; Scheduled Monument Index No. 2205) for which consideration of potential cumulative impacts was considered necessary, the location of this heritage asset is shown on Figure 10.3. A visualisation to aid in this assessment is presented as Figure 10.9; the location from which the visualisation was taken is shown on Figure 10.3.

10.5 Potential indirect and secondary effects on archaeological and cultural heritage assets associated with the access route to the Site for construction traffic are described in **Chapter 14: Access Traffic and Transport**.

[1] Institute for Archaeologists (IfA) (20122) By-Laws: Code of Conduct. Institute for Archaeologists.
[2] Institute for Archaeologists (IfA) (2009); Standard and guidance for archaeological desk-based assessment. Institute for Archaeologists.
[3] The Highland Council (March 2012) *Standards for Archaeological Work*

Legislation and Policy Context

10.6 The primary planning policy and guidance comprises the Scottish Historic Environment Policy document (SHEP)[4], Scottish Planning Policy (SPP) and Planning Advice Note (PAN) 2/2011[5] at national level, and at the regional and local level the Highland-wide Local Development Plan[6], The Highland Historic Environment Strategy, Interim Supplementary Planning Guidance[7], and the Nairnshire Local Plan[8].

National Legislation and Policy

10.7 SHEP sets out Scottish Minister's policies for the historic environment, and provides policy direction for Historic Scotland and a framework that informs the day to day work of a range of organisations that have a role and interest in managing the historic environment. Through the implementation of the SHEP, Scottish Ministers wish to achieve three outcomes for Scotland's historic environment:

- that the historic environment is cared for, protected and enhanced for the benefit of our own and future generations;
- to secure greater economic benefits from the historic environment; and
- that the people of Scotland and visitors to Scotland value, understand and enjoy the historic environment.

10.8 Historic environment resources include statutory and non-statutory designations, as defined in SPP.

10.9 Sites with statutory designations include:

- Scheduled Monuments;
- Listed Buildings; and
- Conservation Areas.

10.10 Sites with non-statutory designations include:

- World Heritage Sites;
- Inventory Gardens and Designed Landscapes;
- Inventory Historic Battlefields; and
- Other Historic Environment Interests.

10.11 SPP requires that planning authorities ensure that development plans provide a framework for the protection, conservation and enhancement of the historic environment and its setting (para 112).

10.12 PAN2/2011 advises that, in determining planning applications[9], planning authorities should take into account the relative importance of archaeological sites (para 5). It also notes that in determining planning applications that may impact on archaeological features or their setting, planning authorities may on occasion have to balance the benefits of development against the importance of archaeological features (para 6). The desirability of preserving a monument (whether scheduled or not) is a material consideration and the objective should be to assure the protection and enhancement of monuments by preservation *in situ*, in an appropriate setting. When preservation *in situ* is not possible, recording and / or excavation followed by analysis and publication of the results may be an acceptable alternative (para 14).

10.13 Those resources relevant to the Proposed Wind Farm Development are Scheduled Monuments and other archaeological features, Listed Buildings and other buildings of historic or architectural importance, and Gardens and Designed Landscapes. There are no World Heritage Sites, Conservation Areas, or Historic Battlefields that would be significantly affected by the Proposed Wind Farm Development, as there are no sites with these designations within 10 km of the Proposed Wind Farm Development which would have theoretical visibility of it.

Sites with Statutory Designations

Scheduled Monuments

10.14 Under the Ancient Monuments and Archaeological Areas Act 1979 (1979 Act)[10], the Scottish Ministers are required to compile and maintain a schedule of monuments considered to be of national importance. The consent of the Scottish Ministers is required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a Scheduled Monument. In addition, impacts of proposed development works upon the setting of a Scheduled Monument form an important consideration in the granting or refusal of planning consent to conduct development works. Further information on development control procedures relating to Scheduled Monuments is provided in the SHEP, SPP and PAN 2/2011.

Listed Buildings

10.15 Under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (1997 Act)[11], the Scottish Ministers are required to compile a list of buildings of special architectural or historic interest. Such buildings are classified into Categories A, B and C, in decreasing order of importance. Planning authorities and the Scottish Ministers are required to have special regard for the desirability of preserving Listed Buildings and their settings, and any features of special architectural or historic importance they possess.

[4] Historic Scotland (2009) Scottish Historic Environment Policy. Edinburgh.
5 The Scottish Office (2011) Planning Advice Note (PAN) 2/2011: Archaeology. Edinburgh.
6 The Highland Council (2012) Highland Wide Local Development Plan – April 2012
7 The Highland Council (2012) Highland Historic Environment Strategy. Interim Supplementary Planning Guidance.
8 The Highland Council (2012) Nairnshire Local Plan Written Statement Adopted Plan December 2000 (As Continued in Force) (April 2012)

[9] Although this application is a Section 36 application, under the provisions of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, the same general guidance applies .
[10] The Scottish Office (1994) *Ancient Monuments and Archaeological Areas Act 1979* (reprinted 1996) HMSO London.
[11] HM Government (1997) Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997, HMSO, London.

Sites with Non-Statutory Designations

Gardens and Designed Landscapes

10.16 The impact of a development on a designated Garden or Designed Landscape listed in 'An Inventory of Gardens and Designed Landscapes in Scotland or its Supplements' (Inventory; published by Historic Scotland) is a material consideration in the determination of a planning application. Under the provisions of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008 planning authorities must consult Historic Scotland on any development that may affect a site contained in the Inventory.

Other Historic Environment Interests

10.17 There is a range of other non-designated archaeological sites, monuments and areas of historic interest, including battlefields, historic landscapes, other gardens and designed landscapes, woodlands and routes such as drove roads that do not have statutory protection. Sites without statutory protection are curated by the local planning authority, and SPP and PAN 2/2011 provide national planning policy guidance and advice on the treatment of such resources.

Regional Policy

10.18 Regional Policy is provided within the Highland-wide Local Development Plan (Adopted 5th April 2012).

10.19 Policy 28 Sustainable Design states that The Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland. Proposed developments will be assessed on the extent to which they:

- impact upon a number of resources, including cultural heritage; and
- demonstrate sensitive siting and high quality design in keeping with local character and the historic and natural environment, including making use of appropriate materials.

10.20 Policy 57 Natural, Built and Cultural Heritage states that all development proposals will be assessed taking into account: the level of importance and type of heritage features; the form and scale of the development; and any impact on the feature and its setting, in the context of the policy framework as detailed in Appendix 2.

10.21 The following criteria will also apply:

- For features of local / regional importance developments will be allowed if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource.
- For features of national importance developments that can be shown not to compromise the natural environment, amenity and heritage resource will be allowed. Where there may be any significant adverse effects, these must be clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services.

10.22 Policy 67 Renewable Energy Developments states that THC will assess renewable energy proposals against other policies of the development plan, the Highland Renewable Energy Strategy and Planning Guidelines and will have regard to other material considerations, including proposals able to demonstrate significant benefits including by making use of existing and proposed infrastructure or facilities. Subject to balancing with these considerations, and taking into account any mitigation measures to be included, THC will support proposals where it is satisfied that they are located, sited and designed such that they will not be significantly detrimental overall, either individually or cumulatively with other developments, having regard in particular to significant effects on a number of matters including: natural built and cultural heritage features.

10.23 The Highland Historic Environment Strategy, Interim Supplementary Planning Guidance (Adopted June 2012) sets out the Council's approach to the protection of the historic environment to ensure that there is a pro-active and consistent approach. The Highland Historic Environment Strategy sets out twenty-eight strategic aims; those relevant to this assessment are:

- Strategic Aim 2:-To ensure that the historic environment is enhanced, protected and promoted and is recognised as the foundation for encouraging high quality and appropriate development to meet the future social and economic needs of the local communities with the Highlands.
- Strategic Aim 6:- That listed buildings within Highland are protected from harmful developments, including extension and alteration, which may affect their special architectural and historic interest or their setting and that there is a presumption against the demolition of listed buildings.
- Strategic Aim 13:- That scheduled monuments - and their setting - within Highland are protected from harmful developments which may affect their national importance.
- Strategic Aim 14:- That all designed landscapes within Highland are protected from harmful developments which may affect their integrity.
- Strategic Aim 16:- To ensure that the importance of non-designated archaeological sites and landscapes and their settings are understood and wherever possible are protected from harmful developments.
- Strategic Aim 17:- To ensure no asset or its setting is lost or altered without adequate consideration of its significance and of the means available to preserve, record and interpret it in line with national and local policy and Highland Council's Standards for Archaeological Work.
- Strategic Aim 25:- To record, protect, promote and seek improvement for all natural features which make a valuable contribution to the historic environment.
- Strategic Aim 26:- To ensure that management of the historic environment is based on considered judgement of how best to protect and enhance its importance and value.

- Strategic Aim 27:- To promote and advocate best practice in heritage protection in the Highlands through the planning process.
- Strategic Aim 33:- To ensure that proposed new developments have due regard to the archaeological, historical and cultural significance of all aspects of the local environment.

10.24 The Highland Council Standards for Archaeological Work (Adopted March 2012) is intended to set practical standards to ensure a consistent approach to the management of the historic environment in the Highlands. The Standards are intended for use by all those involved in the planning process and land management - to inform planners and developers of the specific requirements of a particular piece of archaeological work and to ensure historic environment practitioners conduct fieldwork to an acceptable and consistent standard.

10.25 Relevant sections are:

- Section 3 (Survey): specifically sections on Desk-based Assessment (para 3.1 - 3.7) and Walkover Survey (para 3.8 - 3.11). The specifications set out in Section 3 have been followed for the acquisition of baseline data presented in the following assessment. The range of resources set out in the Standards document has been consulted.
- Section 4 (Environmental Statements): para 4.1 - 4.14. The requirements set out in Section 4 are recognised in the following assessment.

10.26 The 10 km radius study area also includes part of the Moray Council area. Policies relating to cultural heritage are provided in the Moray Local Plan (2008).

10.27 Policy BE1: Scheduled Monuments and National Designations: states that: Development proposals will be refused where they will adversely affect Scheduled Monuments and nationally important archaeological sites or their settings unless the developer proves that any significant adverse effect on the qualities for which the site has been designated are clearly outweighed by social or economic benefits of national importance.

10.28 Development proposals which will adversely affect sites of local archaeological importance, or their settings, will be refused unless it can be demonstrated that;

- Local public benefits clearly outweigh the archaeological value of the site, and
- There is no suitable alternative site for the development, and
- Any adverse effects can be satisfactorily mitigated at the developer's expense.

10.29 The Council will consult Historic Scotland and the Regional Archaeologist on development proposals which may affect Scheduled Monuments and archaeological sites.

10.30 Policy BE2: Listed Buildings states that: The Council will encourage the protection, maintenance, enhancement and active use of listed buildings. Development proposals will be refused where they would have a detrimental effect on the character, integrity or setting of the listed building(s).

10.31 Policy BE4: Gardens and Designed Landscapes states that: Development proposals which will adversely affect Gardens and Designed Landscapes or their settings will be refused unless:

- the overall character and reasons for designation will not be compromised, or
- any significant adverse effects can be satisfactorily mitigated and are clearly outweighed by social, economic and strategic benefits.

10.32 The Council will consult Historic Scotland and Scottish Natural Heritage on any proposal which may affect the sites in the Inventory of Gardens and Designed Landscapes.

Issues Identified during Consultation

10.33 A provisional list of cultural heritage viewpoints was sent to Historic Scotland and to THCHET (28/09/2012) for their consideration and agreement. Subsequently a revised list was proposed in the scoping report (03/05/13) for further consultation.

Table 10.1 Issues identified during consultation

Consultee	Issue	Where / How this is Addressed
Historic Scotland (Response to Visualisation Proposals, received 19 October 2012)	Confirmed they were content with the list of proposed viewpoints.	Visualisations are presented as Figures 10.4 - 10.9 and Figures 7.18 and 7.23 in the LVIA chapter.
	Requested a photomontage looking north towards Lochindorb Castle (Scheduled Monument Index No. 1231) should be included.	A photomontage is presented as Figure 7.23 in the LVIA Chapter.
Aberdeenshire Council Archaeologist (advisor to Moray Council) (Response to Visualisation Proposals, received 21 November 2012)	Confirmed they were content with the visualisations proposed.	Visualisations are presented as Figures 10.4 - 10.9 and Figures 7.18 and 7.23 in the LVIA chapter.
	Requested an additional viewpoint from the Pictish Fort at Burghead (SMR Ref No. NJ1NW001; Scheduled Monument (Index No. 2205), to consider potential cumulative impact on the fort, which is also a Property in Care and notable visitor attraction on the northeast coast.	A cumulative 360° wireline visualisation is presented as Figure 10.9.
Save Our Dava (Response to scoping Visualisation Proposals, received 10 May 2013)	Suggested an alternative location for the viewpoint to assess the impact upon the setting of Lochindorb Castle, suggested that the ideal viewpoint is from the summit of Carn nan Gabhar (29787 83538).	A photomontage is presented as Figure 7.23 in the LVIA Chapter.
	Suggested that the following sites should also have viewpoints ▪ Aitnoch, cairn, hut circle and field system (Scheduled Monument Index No. 4362) ▪ Edinkillie Railway Viaduct	Wireline visualisations and photographs are presented: ▪ Figure 10.5 (Aitnoch, cairn, hut circle and field system) ▪ Figure 10.8 (Edinkillie Railway Viaduct
Historic Scotland (Scoping Opinion, received 4 June 2013))	Confirmed that there are no scheduled monuments, Category A Listed Buildings, Gardens or Designed Landscapes or Inventory Historic Battlefields within the Site.	No action required.
	Highlighted that the following assets should be considered in terms of the potential impact upon their setting: ▪ Ardclach Bell Tower (Scheduled Monument	Indirect impacts are considered in paragraphs 10.92-10.95. Figure 10.3 indicates the location of these heritage assets, the ZTV

Table 10.1 Issues identified during consultation

Consultee	Issue	Where / How this is Addressed
	Index No. 90020, Category A Listed Building No. 551 & Property in Care) ▪ Levrattich, cairn 340 m W of (Scheduled Monument Index No. 11738) ▪ Dunearn, fort 520 m S of (Scheduled Monument Index No. 2470) ▪ Lochindorb Castle (Index No. 1231) ▪ Aitnoch, cairn, hut circle & field system 1400 m SSE of (Scheduled Monument Index No. 4362) ▪ Glenferness House (Category A Listed Building No. 560) ▪ Dunphail House (Category A Listed Building No. 2171) ▪ Darnaway Castle (Category A Listed Building 2283) ▪ Relugas GDL ▪ Darnaway Castle GDL Historic Scotland welcomed the proposed list of visualisations to be included in the EIA, which had previously been provided to them.	and the locations from which any visualisations have been taken. The visualisations are presented as Figures 10.4 – 10.9 and Figures 7.18 and 7.23 in the LVIA chapter.
	Request that the potential cumulative impacts of the proposed development in combination with other developments in the vicinity should be assessed.	Cumulative impacts are considered in paragraphs 10.122-10.127.
The Highland Council (Scoping Opinion, received 14 June 2013)	The ES should identify all designated heritage sites which may be affected either directly or indirectly by the proposed development.	Direct impacts are considered in paragraph 10.91. Indirect impacts are considered in paragraphs 10.92-10.95.
	A detailed walkover survey of the entire development area will be required.	The results of the walkover survey are presented in paragraphs 10.57-10.78.
	Indirect impacts should be considered. Where significant indirect impacts are predicted they should be illustrated using photomontages.	Indirect impacts are considered in paragraphs 10.98 - 10.126 Visualisations are provided as Figures 10.4 – 10.9.
	Cumulative impacts should be considered.	Cumulative impacts are considered in paragraphs 10.122-10.127.
	Agreed that the proposed list of receptors is sufficient. Suggested the addition of Aitnoch, cairn, hut circle and field system 1400 m SSE of (Scheduled Monument Index No. 4362) should be included to ensure appropriate coverage.	A visualisation (wireframe and photograph) from Aitnoch cairn, hut circle and field system is provided as Figure 10.5.
	Note that mitigation to offset any predicted impacts, and where appropriate any compensatory measures, should be set out clearly as part of the assessment.	Proposed mitigation measures are set out in paragraphs 10.84-10.90.

Table 10.1 Issues identified during consultation

Consultee	Issue	Where / How this is Addressed
Moray Council (Scoping Opinion, received 17 June 2013)	No issues relevant to cultural heritage assessment raised.	No response required.

Assessment Methodology

Baseline Characterisation

Desk-based Assessment

10.34 Up-to-date information was obtained from appropriate sources on the locations of historic environment (archaeological and built heritage) sites with statutory protection and non-statutory designations both within the Site and within 10 km of the outermost turbines of the Proposed Wind Farm Development.

10.35 Details of the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields in GIS were downloaded from the Historic Scotland Spatial Data Warehouse[12]. Additional information on known archaeological sites and features within the Site, was provided by the Highland Council Historic Environment Record (HER).

10.36 Information on the character and condition of known archaeological sites and monuments within the Site was obtained from the Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS).

10.37 Ordnance Survey maps and other historic maps held by the Map Library of the National Library of Scotland were examined, to provide information on assets of potential archaeological significance and on historic land-use development.

10.38 An assessment was made of vertical aerial photograph collections held by RCAHMS. Sorties dating from 1946 to 1988 were examined.

10.39 Bibliographic references and online historical research resources (including Am Baile[13]) were consulted to provide background and historical information.

10.40 The online Historic Land-Use Assessment Data for Scotland (HLAMap[14]), maintained by the RCAHMS, was consulted for information on the historic land use character of the site.

10.41 The Scottish Palaeoecological Archive Database (SPAD[15]) which records the distribution of known sites across Scotland was consulted for information on sites with palaeoenvironmental potential within or adjacent to the Site. There were no entries relevant to this assessment.

[12] Historic Scotland (2011). GIS downloader, available at: http://hsewsf.sedsh.gov.uk/gisdl.html
[13] The Highland Council: Am Baile Website - http://www.ambaile.org.uk/
[14] Historic Land-Use Assessment Data for Scotland Website - http://hla.rcahms.gov.uk/

Field Survey

10.42 An initial survey of the Site was carried out by Kirkdale Archaeology in 2004. This was followed up by a further, detailed reconnaissance field survey across the Site (Figure 10.1) in July 2012, with the following aims:

- to assess the present baseline condition of the known archaeology and heritage features identified through the desk-based assessment and initial survey work;
- to identify any further features of historic environment interest not detected from the desk-based assessment; and
- to assess ground conditions across the Site, and to assess its potential to contain currently unrecorded, buried archaeological remains.

10.43 Identified heritage assets were recorded on *pro-forma* monument recording forms and by digital photography and their positions (and where appropriate their extents) were logged using a Global Positioning System (GPS) accurate to around 1-2 m. Heritage assets were recorded either as point locations (given for some individual features such as cairns and grouse butts) or as linear elements (for trackways and field boundaries). No intrusive archaeological interventions have been carried out as part of this assessment.

10.44 Site visits to heritage assets within a 10 km radius of the Proposed Wind Farm Development (as shown on Figure 10.2 and listed in **Technical Appendix 10.2**) were also carried out in July 2012, in order to assess the character and sensitivity of the settings of these heritage assets. The site visits focused on those heritage assets most likely to receive significant effects on their settings (i.e. those closest to the Proposed Wind Farm Development and those considered on preliminary analysis to potentially be the most sensitive to changes within their settings). Factors considered in the assessment of the setting undertaken during the field visit include:

- the location and orientation of the asset;
- important views of, or from, heritage assets (including of or from the principal façades of Listed Buildings);
- the importance, if applicable, of designed settings; and
- any obvious views or vistas.

Identification of Heritage Assets Whose Settings Might be Impacted by the Proposed Wind Farm Development and Characterisation of their Setting

10.45 Historic Scotland's guidance document, Managing Change in the Historic Environment: Setting[16] , notes that: "*setting should be thought of as the way in which the surroundings of a historic asset or place contribute to how it is experienced, understood and appreciated. Setting often extends beyond the immediate property boundary of a historic structure into the broader landscape*". The guidance also suggests that if a proposed development is likely to impact on the setting of a heritage asset, an objective written assessment should be prepared by the applicant to inform the decision-making process. The conclusions drawn should take into account the significance of the heritage asset and its setting and attempt to quantify the extent of any detrimental impact. The methodology and level of information should be tailored to the circumstances of each case.

10.46 The baseline setting of each relevant heritage asset or related group of assets is characterised on a case-by-case basis. Characterisation of setting of an asset is based upon its properties and location, and takes into account the factors identified in the guidance issued by Historic Scotland. The baseline setting of each asset is characterised principally in terms of the:

- archaeological / historical context of the asset;
- current landscape and visual surroundings of the asset;
- aesthetic and experiential properties of the asset within its surrounding; and
- social value (actual or potential) of the asset as a recreational / leisure or education resource.

10.47 Those assets with designations of national or regional importance (Scheduled Monuments, Category A and B Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields) located within a 10 km radius of the Proposed Wind Farm Development were identified as having settings which might be affected by the development (external receptors). Scheduled Monuments, Category A and B Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields within 10 km of the Proposed Wind Farm Development are all considered. Assessment of effects on Category C Listed Buildings is restricted to those within 5 km of the Proposed Wind Farm Development as these are generally minor vernacular building types of the local historic environment, with localised geographical settings. No sites beyond this 10 km radius were identified as having settings which might be significantly impacted by the Proposed Wind Farm Development.

10.48 The same 10 km radius study area has been used for the assessment of cumulative effects upon the setting of heritage assets. However, the potential for cumulative impacts upon the setting of Burghead fort (Scheduled Monument Index No.2205), which is located 28.4 km to the northeast on the Moray Firth coast, is also considered, as the potential for cumulative impacts upon the setting of the fort was raised as a concern by the Aberdeenshire Council Archaeologist (who acts as advisor to Moray Council).

Method of Assessment

10.49 The importance of cultural heritage assets has been determined from the relative weight given to them in SPP and SHEP. Table 10.2 summarises the relative importance of cultural heritage assets.

[15] SPAD Website - http://xweb.geos.ed.ac.uk/~ajn/spad/

[16] Historic Scotland (2010) 'Managing Change in the Historic Environment – Setting'. Edinburgh

Table 10.2: Importance of Cultural Heritage Assets	
Cultural Heritage Importance	**Definition / Criteria**
National / International	Heritage assets of national or international importance, including: ▪ World Heritage Sites ▪ Scheduled Monuments and sites proposed for scheduling ▪ Undesignated archaeological sites and areas of likely national importance identified in the Historic Environment Records (HER) ▪ Category A Listed Buildings ▪ Inventory Gardens and Designed Landscapes ▪ Inventory Historic Battlefields ▪ Outstanding Conservation Areas (where this designation persists) ▪ Designated Wreck Sites
Regional	Heritage assets of regional importance, including: ▪ Archaeological sites and areas of distinctive regional importance ▪ Category B Listed Buildings ▪ Conservation Areas
Local	Heritage assets of local importance, including: ▪ Category C Listed Buildings ▪ Unlisted historic buildings and townscapes with local (vernacular) characteristics
Lesser	Other heritage assets, including: ▪ Find spots ▪ Unlisted buildings of minor historic or architectural interest ▪ Poorly preserved examples of particular types of features

Assessment of Direct Impacts (Construction Impacts)

10.50 Criteria for assessing magnitude of direct impacts, which measures the degree of change to the baseline condition of a heritage asset that would result from the construction of one or more elements of the Proposed Wind Farm Development, are presented in Table 10.3.

Table 10.3: Magnitude of Direct Impacts	
Level of Magnitude	**Definition**
High	A fundamental change to the baseline condition of the asset, leading to total or major alteration of character.
Medium	A material, partial alteration of character.
Low	Slight, detectable alteration of the baseline condition of the asset.
Imperceptible	A barely distinguishable change from baseline conditions.

10.51 The cultural heritage importance of the asset defined in Table 10.2 and the magnitude of the predicted impact (Table 10.3) are then used along with professional judgement to inform the assessment of the likely significance of the direct impact. Table 10.4 summarises the criteria for assigning significance of a direct impact.

10.52 Major and moderate impacts are considered to be 'significant' in the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 and Amendment Regulations 2008.

Table 10.4: Significance of Direct Impacts (Construction Impacts)				
Magnitude of Impact ▼	**Cultural Heritage Importance of Asset ►**			
	National / International	**Regional**	**Local**	**Lesser**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Imperceptible	Minor	Negligible	Negligible	Negligible

Assessment of Impacts on Setting (Operational Impacts)

10.53 For each heritage asset where a potential impact on setting has been identified, the assessment of possible impacts adopts a four-stage approach:

- identification of the characteristics of the setting of the asset (see paragraph 10.43);
- assessment of the sensitivity of that setting;
- identification of how the presence of the Proposed Wind Farm Development would affect that setting (magnitude of impact); and
- assessment of significance of impact.

Criteria for Assessing Sensitivity of Setting

10.54 Sensitivity of setting has been assessed by considering two factors:

- the relative weight which statute and policy attach to the asset and its setting; and
- the degree to which the baseline setting contributes to the understanding and / or appreciation, and hence value, of the asset.

10.55 The relative weight that statute and policy attach to the asset and its setting is determined using the sensitivity of archaeological and heritage resources set out in Table 10.2.

10.56 The degree to which the baseline setting contributes to the understanding and / or appreciation of the asset has been assessed according to the criteria set out in Table 10.5.

Table 10.5: Contribution of Setting to Understanding and Appreciation of a Historic Environment Receptor	
Contribution	**Definition**
High	A setting which makes a strong positive contribution to the understanding and / or appreciation of the siting and / or historical / archaeological / architectural context of an asset. (E.g. a prominent topographic location; surroundings that include related monuments in close association; surroundings that are believed to be little changed from those when the asset was created).
Moderate	A setting which makes some positive contribution to the understanding and / or appreciation of the siting and / or historical/archaeological/architectural context of an asset. (E.g. surroundings that complement the siting and appearance of an asset, such as the presence of a feature of the rural past within a more recent farming landscape containing little or no urban or industrial development).
Low	A setting which makes little positive contribution to the understanding and / or appreciation of the siting and / or historical/archaeological/architectural context of an asset. (E.g. where surroundings only partially complement the siting and appearance of an asset, such as the presence of a feature of the rural past within a partly urbanised or industrialised landscape).
Negligible	A setting which does not contribute positively to the understanding and / or appreciation of the siting and / or historical / archaeological / architectural context of an asset. (E.g. immediate surroundings of, such as, commercial coniferous single species woodland or an industrial development that is not relevant to understanding the context of the asset).

10.57 These two sets of criteria (Tables 10.2 and 10.5) are combined to assess the overall sensitivity of a setting, as set out in Table 10.6.

Table 10.6: Sensitivity of Setting of a Heritage Asset				
Cultural Heritage Importance of Asset ▼	**Contribution of Setting to Value of Heritage Asset ►**			
	High	**Moderate**	**Low**	**Negligible**
National / International	High	High	Medium	Low
Regional	High	Medium	Low	Low
Local	Medium	Low	Low	Low

Identification of Magnitude of Impact on Setting

10.58 Where it has been determined that the setting of an asset is such that there is no potential for it to be affected by the presence of the Proposed Wind Farm Development (including all assets of lesser cultural heritage importance) the asset is not considered further in the assessment. For the remaining assets, the magnitude of impact on setting was assessed according to the thresholds set out in Table 10.7.

Table 10.7: Magnitude of Impacts on Setting	
Level of Magnitude	**Definition**
High	Fundamental effects obviously changing the surroundings of an asset, such that its baseline setting is substantially or totally altered.
Medium	Effects discernibly changing the surroundings of an asset, such that its baseline setting is partly altered.
Low	Slight, but detectable effects that do not alter the baseline setting of the asset materially.
Imperceptible	A very slight and barely distinguishable change from baseline conditions.

Assessment of Impact Significance

10.59 The significance of an impact on setting depends on both the magnitude of impact and the sensitivity of the setting of the asset. Table 10.8 presents the matrix that will be used to inform the determination of the significance of impacts on setting.

Table 10.8: Significance of Impacts on Setting			
Magnitude of Impact ▼	**Sensitivity of Setting►**		
	High	**Medium**	**Low**
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Minor[17]	Minor	Negligible
Imperceptible	Negligible	Negligible	Negligible

Significance Criteria for Impacts upon Setting

10.60 Significance of impact is classified as major, moderate, minor or negligible, as defined in Table 10.9. Major or moderate impacts are deemed to be significant in the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended).

[17] A non-material change to baseline conditions cannot by its nature lead to a significant impact. A significant impact arises from a material change to baseline conditions. This distinction explains why this particular significance assessment finding is not 'moderate'.

Table 10.9: Significance Criteria	
Level of Significance of Impact	**Definition**
Major	A change to the fabric or setting that leads to a substantial impact on the character, quality or context of an asset.
Moderate	Changes to the fabric or setting that lead to a material impact on the character, quality or context of an asset.
Minor	Changes to the fabric or setting that lead to a detectable but non-material change impact on the character, quality or context of an asset.
Negligible	Changes to a setting that lead at most, to a negligible impact on the character, quality or context of an asset.

Cumulative Assessment

10.61 The assessment of cumulative effects on cultural heritage is based upon consideration of the effects of the Proposed Wind Farm Development on the settings of assets with statutory and non-statutory designations within 10 km of the Proposed Wind Farm Development in addition to the likely effects of other operational, consented and proposed wind farm developments (at the application stage). The assessment employed the cumulative ZTV (Figure 10.3) and takes into account the relative scales (i.e. size and number of turbines), of the various developments, their distances from the affected assets, and the potential degree of visibility from the assets of the various developments. The criteria adopted above in respect of effects on setting were employed to determine the magnitude and significance of the predicted cumulative effects. THCHET suggested in their response to the proposed list of visualisations to be included in this assessment that particular consideration should be given to the potential for a cumulative indirect impact upon Burghead fort, graveyard and chapel, including the Clavie (Scheduled Monument Index No. 2205), a site which lies outwith the 10 km radius. A 360° wireline visualisation from Burghead is presented as Figure 10.9.

Micrositing Allowance

10.62 It should be noted that the layout of the turbines, and hence tracks and cables, would be subject to a 50 m micrositing allowance. The assessment of impacts presented within this chapter has been based upon the layout defined in **Chapter 4: Description of Development**. Any micrositing changes would respect the constraints shown on Figure 3.2: Infrastructure Layout and Constraints such that no infrastructure would be moved to the extent that impacts would be any greater than those reported in this chapter.

Baseline Conditions

Current Baseline

10.63 The locations and extents of heritage assets identified within the Site are shown on Figure 10.1, and detailed information on their character and baseline condition is provided in **Technical Appendix 10.1**. Numbers in brackets, in the following text, refer to asset numbers as shown on Figure 10.1 and described in **Technical Appendix 10.1**.

10.64 Twenty-six heritage assets have been recorded within the Site; they span a considerable period from prehistory, through the medieval period and into the 20th century. They are discussed thematically below.

Prehistoric Sites

10.65 Two possible hut circles (**16a** & **b**), on the southeast slope of Cairn Duhie were recorded by field survey carried out in 2004 and were described as being approximately 7 m and 4 m in diameter respectively. Further field survey in 2012 found the area to now be covered by thick heather vegetation and the baseline condition of the hut circles could not be verified; the previous survey has however established their locations sufficiently accurately to ensure their avoidance. The location of the structures, close to a plateau of better drained land, suggests that the structures may alternatively be the remains of shieling huts of medieval or pre-improvement date; although a possible prehistoric date cannot be ruled out. The possible hut circles or shieling huts are considered to be of local cultural heritage importance.

Medieval or Later Farmsteads and Other Agrarian Structures

10.66 The remains of three farmsteads (**1**, **9** & **14**) and other associated features (**13b, 2** & **23**) were recorded within the Site. The earliest cartographic evidence which has been found for settlement in the area comes from Roy's Military Survey[18] (1747-55) which depicts a settlement named 'Lynemor' which is believed to correspond with the recorded farmstead (**1**) at Stripe of Muckle Lyne. The farmstead is depicted on the First Edition Ordnance Survey map[19] (1874) as an unroofed building indicating that it had gone out of use by this date.

10.67 Field survey in 2012 located the remains of this farmstead at Stripe of Muckle Lyne (**1**) which comprises: the remains of a two compartment building (**1a**); remains of a second building (**1b**); a small structure of unknown purpose (**1c**); and, the remains of a field or enclosure (**1d**), located to the west of the settlement. The remains of the buildings survive in an extremely overgrown state, and the possibility of other associated remains surviving in the same area cannot be excluded. To the northwest of the farmstead (**1**) are the remains of a further structure (**13b**) which may be associated with it. This possible structure survives as a sub-rectangular platform approximately 6 m x 4 m which is terraced into the hillslope with an earthwork bank on its down-slope side. The purpose of the platform is unknown; taking into account its rectangular shape and dimensions, it is likely to be the site of a former building. Both of these sites (**1** & **13b**) are considered to be of local cultural heritage importance.

10.68 At the northern end of the Site are the remains of 'Botnamain' farmstead (**9a**) and its associated field system (**9b**). 'Botnamain' is depicted on the First Edition Ordnance Survey

[18] Roy, W. (1747-55) Military Survey of Scotland.
[19] Ordnance Survey (1874) *Nairnshire*. Sheet VIII,, 6" to 1 mile

map (1874)[20], as a series of three buildings, two of which are roofed and one unroofed, set within an enclosure. An area of improved pasture (**9b**) is located to the northwest. The remains of two of these buildings were identified by the 2012 field survey, but thick vegetation prevented the identification of any remains of the third building. A trackway connecting the farmstead with the modern A939 road remains in use. The field system related to the farmstead remains visible partly as defunct ditch and bank boundaries, with other boundaries by modern post and wire fencing. A square structure, which is thought to be the remains of a kiln (**2**), lies at the edge of the field system, surviving in good condition as turf covered stone-built remains. Towards the eastern edge of the field system the remains of a collapsed structure (**23**) were identified by the field survey. The rectangular shape of the area of partially turf-covered stones suggests that this is perhaps the collapsed remains of a building associated with 'Botnamain' farmstead. The farmstead is considered to be of local cultural heritage importance.

10.69 Close to the western boundary of the Site are the remains of a further building (**14**), believed to be a farmstead. The building, which is not depicted on any cartographic sources, measures approximately 14 m x 9 m and survives in a heavily overgrown condition. The remains of this farmstead are considered to be of local cultural heritage importance.

10.70 Two structures (**7** & **17**), which are not depicted on any cartographic sources, were found just to the west of the summit of Cairn Duhie. The first (**7**) measures approximately 10 m x 6 m and is up to 0.9 m in height. Further to the east, and located against the slope of Cairn Duhie, structure (**17**) is rectangular in form and measures approximately 9 m x 6 m and survives to approximately 0.7 m in height. These features are located close to a plateau of better quality land to the north of the summit of Cairn Duhie and are considered most likely to be the remains of shieling huts. These two structures are considered to be of local cultural heritage importance.

10.71 A number of clearance cairns / spreads (**8, 10**, **11**, **12**, **15**, **18**, **21**, **22** & **25**) have been identified across the Site, many of these lying within or close to the area of improved land at 'Botnamain' farmstead (**9**). These provide evidence of attempts to improve the quality of the land either for cultivation or as pasture. The clearance cairns / spreads are considered to be of local cultural heritage importance, with the exception of a modern clearance cairn (**18**) which is considered to be of lesser cultural heritage importance.

Miscellaneous Features

10.72 Four quarries (**4a**-**4d**) were identified towards the southern end of the Site. Although their original purpose is unclear, their proximity to the public road (A939) suggests that they may have provided stone or gravel for use in its construction. The quarries are considered to be of lesser cultural heritage importance.

10.73 A triangulation station (**5**) is depicted on the First Edition Ordnance Survey map[21] (1874). The 2012 field survey found that a marker cairn approximately 0.7 m in height and 6 m in diameter now occupies this position, at the summit of Cairn Duhie. To the immediate north of this cairn lies a second cairn (**6**) measuring approximately 6 m in diameter and 0.7 m in height and considered to be a shepherd's cairn, used to aid navigation across the fells. The marker cairn and shepherd's cairns are both considered to be of local cultural heritage importance.

10.74 The First Edition Ordnance Survey map (1874) depicts a 'Cairn (Of Stones)' (**20**), further to the southwest of those described above, but the 2012 field survey found no upstanding remains of a cairn at the cited location. This former cairn is considered to be of lesser cultural heritage importance.

10.75 A trackway (**19**) which was depicted on the First Edition Ordnance Survey map [22](1874) runs across the Site in a northwest to southeast direction. Field survey in 2004 identified only a short length of this former track; which is evidently no longer used. Field survey in 2012 also identified a second trackway (**24**), connecting the farmstead of 'Little Lyne' with the areas of improved pasture surrounding the former farmstead of 'Botnamain' (**9**). Both trackways are considered to be of lesser cultural heritage importance.

10.76 An area of former peat cuttings (**3**) was recorded by the 2012 field survey close to the western boundary of the Site. The peat cutting is located to the southeast of building (**14**) and may have been associated with its occupation. The peat cuttings are considered to be of lesser cultural heritage importance.

10.77 A number of grouse butts were recorded across the Site, surviving in various conditions, often overgrown with heather and other vegetation. The grouse butts are of two different types. The first type (a) comprise linear trenches up to 3 m in length, 1 m wide and up to 0.75 m deep with a bank of upcast soil on their downslope side. The second type (b) consisted of a sub-rectangular depression with surrounding banks, and measured up to 6 m in diameter, up to 0.7 m in depth and 0.7 m in height, many with a small drainage channel running downslope from their interior. A further probable grouse butt (**13a**) was identified towards the northern end of the site. As evidence of historic (possibly 19th century) recreational sports shooting, the grouse butts are considered to be collectively of local cultural heritage importance, with each individual grouse butt being of lesser cultural heritage importance.

Archaeological Potential of the Site

10.78 Evidence of prehistoric activity within the Site is limited to two possible hut circles (**16 a & b**), but there are a number of other features of prehistoric date in the wider area, including a possible Neolithic cairn (MHG 7165) approximately 2.3 km to the south of the Site at Hill of Aitnoch. A cist burial (MHG 17639) was also found at Aitnoch in 1860.

10.79 The village of Ferness is located to the north of the Site, and is suggested on the basis of placename evidence to have been the site of a pre-Reformation chapel (MHG 7166). The placename Dalnaheiglish, which is used on the First Edition Ordnance Survey map, means 'meadow of the church'.

[20] Ordnance Survey (1874) *Nairnshire, Sheet VIII*. 6" to 1 mile.
[21] Ordnance Survey (1874) *Nairnshire*. Sheet VIII,, 6" to 1 mile
[22] Ordnance Survey (1874) *Nairnshire*. Sheet VIII,, 6" to 1 mile

10.80 Other later features are primarily related to the medieval and post-medieval agricultural use of the land, and include seasonal pasturing sites, such as the group of three shieling huts at Tomnarroch Burn (MHG35533). Post-medieval farmsteads are common in the area, including on to the immediate north of the Site at Muckle Lyne (MHG 26472).

10.81 The Fort George Military road (MHG 34538) runs to the west of the Site, and another length of 18th century military road (NJ04NW0097) runs to the east of the Site, indicating that the area would have been well connected from the 18th century onwards.

10.82 The Historic Land-use Assessment Data for Scotland (HLA map) indicates that the Site consists principally of an area of rough grazing which may contain surviving evidence of occupation from the prehistoric period onwards. A small area of land at the western edge of the Site is suggested to have been used for traditional peat extraction during the 18th – 20th centuries. The presence of numerous grouse butts within the Site indicates that the moorland has been extensively used (probably since the mid-19th century) for game shooting.

10.83 The Site is currently used as rough pasture, with a limited area of improved pasture at the extreme northern end of the site. Extensive efforts to improve the ground through land drainage are evident, particularly at the southern end of the Site.

10.84 Taking into account the lack of extensive development which has occurred within the Site in recent times, and the evidence for prehistoric activity and continued settlement within the wider area from the prehistoric period through to the post-medieval period and later, it is considered that there is a moderate potential of as yet undetected remains surviving within the Site. However, given the limited land take necessary for the construction of the Proposed Wind Farm Development, the probability of encountering sites or features of archaeological significance is judged to be low.

Cultural Heritage Assets within 10 km of the Proposed Wind Farm Development

10.85 The blade tip height ZTV for the Proposed Wind Farm Development indicates that there are eight Scheduled Monuments (one of which is also a Category A Listed Building), two other Category A Listed Buildings, eight Category B Listed Buildings, and two Inventory Gardens and Designed Landscapes within 10 km of the Proposed Wind Farm Development from which there is predicted visibility of the turbines. In addition to these, there are six Category C Listed Buildings within 5 km of the Proposed Wind Farm Development that have predicted visibility of the turbines. These are shown on Figure 10.2 and described in **Technical Appendix 10.2**. There are no Conservation Areas or Inventory Historic Battlefields within the study area from which there would be theoretical visibility of the Proposed Wind Farm Development.

10.86 The cultural heritage assets from which there is predicted visibility of the Proposed Wind Farm Development vary greatly in character and date, and include: prehistoric burial cairns, forts and other prehistoric (and later) settlements. Amongst the listed buildings there are a number of Country Houses, a church, a Castle and several 19th century farmsteads.

Future Baseline

10.87 If the Proposed Wind Farm Development was not to proceed there would be no change to the baseline condition of the heritage assets identified within the Site. The current land-use as rough pasture would probably continue, limiting the potential for disturbance to historic environment assets, and only natural decay would occur to the upstanding remains. There would be no change to the setting of heritage assets.

Potential Impacts

Potential Construction and Decommissioning Impacts

10.88 Any ground breaking activities associated with the construction of the Proposed Wind Farm Development, (such as those required for turbine bases and crane hardstandings, access tracks, cable routes, compounds, etc.) have the potential to disturb or destroy features of cultural heritage interest. Other construction activities, such as vehicle movements, soil and overburden storage and landscaping also have the potential to cause direct, permanent and irreversible impacts on the cultural heritage.

Potential Operational Impacts

10.89 The presence of features of the Proposed Wind Farm Development may have indirect impacts on the setting of cultural heritage assets in the wider landscape. In particular, there is potential for the turbines to be present in views of and from Scheduled Monuments, Listed Buildings and Gardens and Designed Landscapes in the vicinity of the Proposed Wind Farm Development.

Mitigation

Mitigation by Design

10.90 The layout of the Proposed Wind Farm Development and the positioning of the turbines and access tracks have been arrived at through a series of iterative stages to develop the best layout within the context of all environmental and technical constraints. The results of the desk-based study and reconnaissance field survey (as shown on Figure 10.1) were provided as GIS data.

10.91 The layout shown on Figure 10.1 embeds mitigation into the siting of the turbines and other infrastructure to avoid heritage assets wherever possible.

Mitigation during Construction

10.92 Except where otherwise stated all mitigation works presented in the following paragraphs would take place prior to or during the construction of the Proposed Wind Farm Development. All works would be conducted by a professional archaeological organisation, and the scope of works would be detailed in a Written Scheme of Investigation (WSI). The

WSI would make provision for appropriate post-excavation analyses and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records. The WSI would be subject to the approval of THCHET.

Preservation *In Situ*

10.93 Where cultural heritage features lie in close proximity to development features they would be avoided as far as possible, in order to ensure their preservation *in situ.*

- One site, a building (**14**), lies just over 50 m from the proposed access track to T14. Although it is unlikely that any works would be carried out near it, this site would be either entirely fenced off or visibly marked out to prevent accidental damage occurring to the remains during construction activities in the vicinity.

Evaluation / Watching Briefs

10.94 Any requirement for archaeological mitigation, through pre-construction trial trench evaluation or construction phase monitoring of works through watching briefs, would be carried out in accordance with a Condition of Consent. The scope and timing of any such works would be agreed in consultation with THCHET.

Post Excavation

10.95 If significant discoveries are made during any archaeological monitoring, and preservation *in situ* of any remains identified through such monitoring is not possible, provision would be made for the excavation, where necessary, of any archaeological remains encountered. This provision would include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the works, where appropriate.

Construction Guidelines

10.96 Written guidelines will be issued on behalf of the applicant for use by all construction contractors, outlining the need to avoid causing unnecessary damage to known sites. That document would contain arrangements for calling upon retained professional support in the event that buried remains of potential archaeological interest (such as building remains, human remains, artefacts, etc.) should be discovered in areas not subject to archaeological monitoring. The guidance will make clear the legal responsibilities placed upon those who disturb artefacts or human remains.

Assessment of Residual Impacts

Residual Construction (Direct) Impacts

10.97 The assessment of residual construction (direct) impacts has been carried out with reference to the Proposed Wind Farm Development layout and cultural heritage assets shown on Figure 10.1. The criteria detailed in Tables 10.2 – 10.4 have been used to assess the nature and magnitude of the impacts, which are discussed in more detail below. There would be no significant residual impacts on cultural heritage assets identified within the Site (see **Technical Appendix 10.1**). The only two heritage assets within the Site that are predicted to experience any impact are as follows:

- An impact of high magnitude is predicted upon an area of peat cuttings (**3**) as a result of the construction of the control building and substation compound, resulting in a residual impact of minor significance.
- An impact of high magnitude is predicted on two groups of grouse butts. The construction of T2 and its associated hardstanding area will impact upon a group of six grouse butts located on the southern slopes of Cairn Duhie. The access track leading to T20 passes in close proximity to one grouse butt (the most northerly of a line of ten grouse butts which run in a north south direction), and construction activities including vehicle movements have the potential to impact upon this one grouse butt. Taking into account the large number (63) of grouse butts recorded within the Site, and the low number (7) which will potentially be impacted by the Proposed Wind Farm Development, it is considered that there will be a residual impact of minor significance.

Residual Operational Impacts

10.98 The assessment of magnitude of residual operational impacts provided in **Technical Appendix 10.2** has been based upon analysis of the blade tip and hub height ZTVs, taking into account the distance of the assessed asset from the Proposed Wind Farm Development, the number of hubs and blade tips visible, and the present baseline setting of each asset. The ZTV model is, however, a coarse predictive tool based on bare earth topography and maximum blade tip heights. It takes no account of obstructions to intervisibility caused by existing forestry and other vegetation or buildings and other man-made features. Therefore, professional judgement has been used to arrive at the conclusions drawn.

10.99 Heritage assets predicted to receive potentially significant residual impacts, and all assets identified during consultation as requiring consideration within the EIA (Table 10.1) are shown on Figure 10.3, and are discussed below. Where these sites have theoretical visibility of the Proposed Wind Farm Development, they have been further assessed using wireframe visualisations and photomontages (Figures 10.4 – 10.9). The locations from which the visualisations have been taken are also indicated on Figure 10.2 Based on analysis of the blade tip height ZTV, there is no predicted visibility of the Proposed Wind Farm Development from two sites identified during consultation and these are not considered further in this chapter. Those sites are:

- Glenferness House (Category A Listed Building No. 560); and
- Dunphail House (Category A Listed Building No. 2171).

Significant Impacts

10.100 No significant residual impacts upon the setting of cultural heritage assets are predicted (see **Technical Appendix 10.2**).

Non-Significant Impacts

Lochindorb Castle (Scheduled Monument Index No. 1231)

10.101 Lochindorb Castle, a 13th century castle, survives in a ruined condition on an island in Lochindorb. However, the castle's setting on an island in the loch can also be appreciated from further away, when viewing the wider landscape.

10.102 The blade tip ZTV shows that from the castle there will be no visibility of the Proposed Wind Farm Development; neither would there be any visibility of the turbines from the loch shore or the public road that runs along the southwest side of the loch and from where the setting of the Castle can be best appreciated.

10.103 Figure 7.23 in **Chapter 7: Landscape and Visual Amenity** is a photomontage showing a view of Lochindorb Castle from an elevated position on the summit of Carn nan Gabhar, a popular local walking destination. The Proposed Wind Farm Development would be visible in this view just to the east of the castle and beyond the shoulder of Hill of Aitnoch. The turbines will be over 6 km away and, although they will form a new element within the view from this location, they would not detract from appreciation of the position of Lochindorb Castle within the loch. Appreciation of the setting from the nearer vantage points around the loch shore would be unaffected by the Proposed Wind Farm Development.

10.104 Taking into account the fact that the turbines would be visible in the same view as Lochindorb Castle only from elevated locations on Carn Ruigh Chorrach and Carn nan Gabhar, it is considered that the effect of the Proposed Wind Farm Development on the setting of Lochindorb Castle would be of low magnitude and minor significance.

Dunearn, Fort 520 m S of (Scheduled Monument Index No. 2470)

10.105 The remains of Dunearn fort (of probable Iron Age date) occupy a prominent crag within the Findhorn Valley in a strategic position above the river, which would have been important both for defensive reasons and as a means of displaying power and authority. The fort would have had commanding views in all directions emphasising its strategic importance, and these views are important in understanding why this location was chosen. At present the fort is surrounded by trees both on the hill slopes and around the ramparts; these trees now partially screen views outwards from the fort towards the wider landscape.

10.106 Figure 10.4 provides a photograph and a wireframe view, which show that all turbines of the Proposed Wind Farm Development would be visible from the fort, in the view to the northeast, in the absence of the trees which currently surround it. At present the trees surrounding the fort mean that views of the turbines would be partially screened. Views outwards from the fort in other directions would be unaffected. Views of the hilltop fort from locations in the lower lying ground around it, in particular from the River Findhorn, would also be unaffected.

10.107 The Proposed Wind Farm Development would have no effect upon the ability to appreciate or understand why a settlement on this prominent crag would appear so imposing during the prehistoric period; it is considered that the impact of the Proposed Wind Farm Development would be of low magnitude and minor significance.

Aitnoch, Cairn, Hut Circle and Field System 1400 m SSE of (Scheduled Monument Index No. 4362)

10.108 This asset consists of a hut circle visible as a low platform, located close to the south eastern edge of a field system, which is visible as a number of stone clearance heaps and lynchets. A kerbed cairn (burial cairn) approximately 8 m in diameter and 0.5 m high is located among the clearance cairns. The asset's importance is in part derived from the fact that these three interrelated elements survive in combination with each other, and these interrelationships form a key part of the setting of the cairn, hut circle and field system. The cairn, hut circle and field system are situated on a southeast facing slope, with key views of and from the asset therefore being from and to the southeast.

10.109 The blade tip ZTV indicates that there would be no visibility from the southern part of the scheduled area. A maximum of seven turbine hubs and 16 turbine tips would theoretically be visible from the northern part of the area. Figure 10.5 provides a photograph and wireline view from the northern part of the scheduled monument towards the Proposed Wind Farm Development. The local topography partially screens views of the proposed turbines, such that from this location three turbines hubs and eight turbine tips are visible in the wireline view.

10.110 The Proposed Wind Farm Development would be visible only from the northern part of the scheduled monument, would not be visible in the main view from the asset to the southeast, and would have no effect upon understanding and appreciation of the interrelationship between the three elements of the scheduled monument. Therefore, it is considered that the Proposed Wind Farm Development would have a slight, detectable effect upon the setting of the asset, which would not affect the setting materially, resulting in an effect of low magnitude and minor significance.

Levrattich, Cairn 340 m W of (Scheduled Monument Index No. 11738)

10.111 Levrattich cairn comprises a turf-covered burial cairn, which lies in the middle of a cultivated field. It is positioned on a gently sloping hillside with good views towards the valley below. This position would also have been visible from the wider landscape, and it is thought that this kind of visibility may have played a role in demonstrating territorial land ownership.

10.112 Currently, an overhead power line runs approximately 100 m to the west of the cairn, and pylons form an intrusive element in its setting. Figure 10.6 provides a photograph and wireline showing the theoretical view towards the Proposed Wind Farm Development from the cairn. It indicates that the turbines of Berry Burn Wind Farm are visible in distant views to the east. The proposed turbines would be visible against the distant horizon, in a limited arc of view to the southeast, with intervening forestry plantations partially screening these views.

10.113 The Proposed Wind Farm Development would have no effect on the ability to appreciate the intentional location of the cairn to be visible from, and to have views of the wider landscape. The turbines would be a new detectable, but not prominent, element in views to the southeast. Views in other directions would not be affected. Overall it is considered that there would be a slight, detectable effect upon the baseline setting of the cairn, resulting in an effect of low magnitude and minor significance.

Ardclach Bell Tower (Scheduled Monument Index No. 90020, Category A Listed Building No. 551 & Historic Scotland Property in Care)

10.114 Ardclach Bell Tower is a small two storey watchtower with the later addition of a small belfry on the southeast gable end of the tower; housing the church bell for the parish kirk, which lies to the southeast, in the Findhorn valley below.

10.115 The Bell Tower occupies a hilltop location, from which there are extensive views to the east, south and west, an important feature in understanding the tower's function as a watchtower. The most notable view from the tower is southwards along the Findhorn valley. The bell tower is a promoted visitor attraction approached via a footpath from the valley to the south.

10.116 The photomontage of the predicted view of the Proposed Wind Farm Development from Ardclach Bell Tower (LVIA Viewpoint No. 6, Figure 7.18) shows that all 20 turbines would be visible from the immediate vicinity of the Tower, in a narrow arc of view to the southeast. The Proposed Wind Farm Development would not however be prominently visible in other outward views from the bell-tower (to the southwest) and they would not be visually intrusive when approaching the tower, or when considering the relationship between the kirk and the bell tower.

10.117 Although the turbines would be a new and detectable element in the landscape surrounding the bell tower, they would not significantly affect key aspects of the historic setting of the bell tower. As such it is considered that the Proposed Wind Farm Development would have an impact of low magnitude and minor significance, which would not significantly affect the heritage value of the bell tower.

Darnaway Castle GDL

10.118 Darnaway Castle GDL provides the setting for the Category A Listed Building of Darnaway Castle; the GDL comprises areas of late 18th and early 19th century parkland with associated trees, avenues, clumps and areas of woodland and forest, as well as the late 19th and early 20th century formal terraced, Dutch and walled gardens which are located adjacent to the house.

10.119 The ZTV shows that theoretical visibility of the Proposed Wind Farm Development is limited primarily to the northern part of the GDL, and corresponds almost entirely with areas of woodland or forestry within the GDL, where trees will screen views of the proposed turbines.

10.120 Figure 10.7 shows the theoretical view of the Proposed Wind Farm Development from 8 m above ground level at the location of the building of Darnaway Castle, and gives an indication of the theoretical views from the upper storeys of the Castle. Three turbine tips would theoretically be visible from this location, although taking into account the 11.2 km distance between the house and the closest proposed turbine, it is likely that local topography, and vegetation would screen views of at least some of these turbine tips.

10.121 The Proposed Wind Farm Development would not be visible from the majority of the GDL, and plantation woodland would limit views of the Proposed Wind Farm Development from the majority of those locations where it would theoretically be visible. The Proposed Wind Farm Development would therefore have an impact of low magnitude and minor significance upon the setting of the Darnaway Castle GDL.

Relugas GDL

10.122 Relugas GDL is an excellent example of the 19th century picturesque style of landscape design which provided the setting for the former Relugas House, which was demolished in 1957, and which is purposely located around the confluence of the Rivers Findhorn and Divie. The ZTV indicates that there is theoretical visibility of the proposed turbines only from a small portion of the southern end of the GDL, the majority of which is woodland policies, where trees would limit long distance views towards the Proposed Wind Farm Development. Two cultivated fields at the southern end of the GDL would be the only part of it from which there would be views of the Proposed Wind Farm Development, with four turbine hubs, and 20 turbine tips theoretically being visible. There would be no visibility from Relugas House or from other key features of or within the GDL. It is therefore considered that the Proposed Wind Farm Development would cause only a very slight and barely distinguishable change to the baseline setting of the GDL, resulting in an impact of imperceptible magnitude and negligible significance.

Edinkillie Railway Viaduct (Category B Listed Building No. 2189)

10.123 The Edinkillie Railway Viaduct is part of the former Inverness & Perth Junction railway, and comprises seven arches which support the former railway track approximately 32 m above ground level where it crosses the River Divie. The viaduct is aligned roughly north south. Although the railway is no longer in existence, the viaduct forms part of the Dava Way walking route, which follows the former route of the railway.

10.124 The architecture of the viaduct is best appreciated from below, when passing along the road through the valley, from which location there is no predicted visibility of the Proposed Wind Farm Development. Furthermore, its setting is largely localised to the valley over which it carried the former railway. The viaduct is very much a functional feature and the views achieved from it when passing along it are not important to understanding its function.

10.125 Figure 10.8 shows a photograph of the existing view, and a wireframe of the theoretical view of the proposed turbines when crossing the viaduct, in views towards the southwest. All 20 turbines would theoretically be visible from this elevated position, as shown by the wireframe. However, views towards the Proposed Wind Farm Development, to the west when crossing the viaduct, would be entirely screened by trees along the near horizon. Views to the east when passing over the viaduct would be unaffected. No turbines would be

visible in the principal views on approach to the viaduct from either the north or the south, along the former course of the railway.

10.126 Taking into account the lack of visibility of the Proposed Wind Farm Development from those locations from which the architectural and cultural heritage significance of the Edinkillie Railway Viaduct is best appreciated and its function understood, it is considered that the Proposed Wind Farm Development would cause only a very slight and barely distinguishable change to the baseline setting of the asset, resulting in an impact of imperceptible magnitude and negligible significance.

Cumulatives

10.127 Figure 10.3 shows the Proposed Wind Farm Development, the location of key historic environment assets within 10 km of the outermost turbines from which there would be predicted views of the turbines, and the location of those other wind farm developments most likely to have a cumulative effect on historic environment assets. Wind farms at the Operational, Under Construction, Consented, Appeal / Public Inquiry, Application Submitted, and Design / Scoping stages are all included in the assessment. The locations of all the cumulative developments within 35 km of the site are shown on LVIA Figure 7.9, Volume 3.

10.128 The cumulative developments relevant to the assessment of cumulative impacts on the setting of heritage assets are:

- Berry Burn (Under Construction, 29 turbines, between 90 and 104 m to blade tip); and
- Hill of Glaschyle (Application Submitted, 12 turbines, 99.5 m to blade tip).

10.129 Taking into account the limited theoretical visibility of the Proposed Wind Farm Development, it is considered that from all cultural heritage assets considered in the assessment, the cumulative developments would be either too distant to significantly add to the cumulative visual impact on the setting of the individual or collective assets, or would not be visible in combination with the Proposed Wind Farm Development. In addition, the variable topography and screening from woodland and forestry would further restrict the visual impact on the settings of the assets; therefore no other significant cumulative impacts are predicted.

10.130 At the specific request of Moray Council's Archaeological Advisors (ACAS) Burghead Pictish Fort is considered here in terms of the potential for cumulative impact arising from the Proposed Wind Farm Development in combination with other proposed wind farms in the wider landscape (both onshore and offshore).

10.131 Burghead Pictish Fort (Scheduled Monument Index No. 2205) is located on the Moray Firth coast to the northeast of Forres and 28.4 km to the northeast of the Proposed Wind Farm Development. The ZTV for the fort is shown as an inset map on Figure 10.3. The fort, which is a Property in Care and promoted as a visitor attraction comprises the remains of a massive promontory fort dating to the mid-1st millennium AD and is the possible site of a contemporary or later Christian centre. It is one of the most impressive early Historic fortresses in northern Scotland and commands extensive views across the Moray Firth and along the southern shoreline of the Firth. Figure 10.9 provides a 360° wireline visualisation of the predicted theoretical view from Burghead Fort together of the Proposed Wind Farm Development together with other cumulative schemes. The Proposed Wind Farm Development would lie more than 24 km to the southwest, beyond Kinloss and Forres and back-dropped by distant hills, within a very narrow arc of view. It is very unlikely that, at this distance and against the mountain backdrops, the turbines would be readily visible and they would not noticeably affect the coastal setting of Burghead Fort. The operational wind farms at Findhorn (four turbines - three at 44 m high and one at 24 m high) and Bognie Farm (one turbine, 61 m high) lie between Burghead Fort and the Proposed Wind Farm Development. A wind farm at Cluny Farm (one turbine, 61 m high) and further wind farm (12 turbines, 99.5 m high, at Hill of Glacshyle), at the application stage, also lie between the Fort and to either side of the Proposed Wind Farm Development in the view. The cumulative wireline also shows that the consented Tom Nan Clach Wind Farm would also be theoretically visible over 40 km distant. Rothes Wind Farm (Phases 1 and 2), the proposed Kellas and Brown Muir wind farms would also be theoretically visible from Burghead Fort (beyond Burghead town), but not in the same arc of view as the Proposed Wind Farm Development.

10.132 Based on an assessment of the cumulative wireline, the cumulative impact arising from the Proposed Wind Farm Development in combination with other operational, consented and proposed wind farms on the setting of Burghead Fort would be of low magnitude and minor significance.

Summary

10.133 A desk-based assessment and reconnaissance field survey have been carried out for the Proposed Wind Farm Development. The assessment has been informed by comments and information supplied by Historic Scotland, THCHET and the Aberdeenshire Council Archaeologist (who acts as Advisor for Moray Council).

10.134 Twenty-six assets of cultural heritage interest have been identified within the Site. The majority of these assets are related to post-medieval, pre-improvement period agricultural use of the landscape and none of the assets identified are assessed as being of more than local cultural heritage importance.

10.135 An assessment of the known cultural heritage resource in the immediate vicinity of the Site indicates that there is a moderate probability of as yet undetected archaeological remains surviving within the Site. However, given the limited land-take required by the separate elements of the Proposed Wind Farm Development the probability of encountering hitherto undiscovered archaeological remains during the course of the construction work is considered to be low.

10.136 There are no significant construction (direct) impacts predicted for known cultural heritage assets identified within the Site.

10.137 No significant indirect effects upon the setting of cultural heritage assets are predicted.

10.138 No significant cumulative impacts upon the settings of cultural heritage assets are predicted.

Table 10.10: Summary of Potential Impacts of the Proposed Wind Farm, Mitigation and Residual Impacts

Likely Significant Impact	Mitigation Proposed	Means of Implementation	Outcome / Residual Impact
Construction (direct)			
Remains of a building (**14**) lie just over 50m from the proposed access track and could potentially be accidentally directly impacted by construction activities in the vicinity.	The remains of the building will be fenced off or visibly marked out to signal their presence to construction workers.	Planning condition.	No direct impact upon the remains of a building (**14**).
Potential for impacts on previously unknown buried archaeological remains	Watching brief during ground breaking works	Planning condition. Monitoring by professional archaeologist(s)	Identification and recording of any remains encountered
Operational			
No significant indirect impacts upon the setting of cultural heritage assets are predicted.	None	None	No significant indirect impacts upon the setting of cultural heritage assets are predicted.
No significant cumulative impacts upon the setting of cultural heritage assets are predicted.	None	None	No significant cumulative impacts upon the setting of cultural heritage assets are predicted.

11 Geology, Hydrology and Hydrogeology

Introduction

11.1 This chapter describes the geology, hydrology and hydrogeology baseline and impact assessment for the Proposed Wind Farm Development. This chapter was developed by Wallingford HydroSolutions Ltd (WHS).

11.2 The direct and indirect potential impacts of the Proposed Wind Farm Development upon the baseline environment during construction, operation and decommissioning are identified within this chapter. Mitigation measures to alleviate those impacts are identified and the significance of the residual impacts is presented.

11.3 Indirect and secondary geological, hydrological and hydrogeological effects associated with the access route to the Site for abnormal loads deliveries are described in **Chapter 14: Traffic and Transport**.

11.4 This chapter is supported by:

- **Technical Appendix 8.7: Outline Habitat Management Plan**
- **Technical Appendix 5.3: Phase 2 Peat Probing & Peat Coring Study**
- **Technical Appendix 5.4: Peat Stability Risk Assessment Report**
- **Technical Appendix 11.1: Carbon Balance Assessment**
- **Technical Appendix 11.2: Private Water Supply Risk Assessment**
- **Technical Appendix 11.3: SuDS Design Statement**
- **Technical Appendix 11.4: SEPA River Basin Management sheets**

11.5 The findings of the carbon balance assessment (**Technical Appendix 11.1**) are summarised in **Chapter 4: Description of Development**.

Legislation and Policy Context

11.6 The following legislation and policy has been consulted to provide the basis of the assessment.

International Legislation and Policy

The Water Framework Directive and its Transposition into National Law

11.7 The Water Framework Directive (WFD, 2000/60/EC), has the main objectives of protecting, enhancing and restoring Europe's waters, with the aim of achieving 'good' status by 2015, establishing a baseline of no deterioration and, encouraging the sustainable use of water resources and the water environment. This directive resulted in the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act), which gives Scottish Ministers powers to introduce regulatory controls over water activities, in order to protect, improve and promote sustainable use of Scotland's water environment.

11.8 The Scottish Environment Protection Agency (SEPA) is the public body responsible for environmental protection in Scotland under both the Environment Act 1995 and the WEWS Act. Many SEPA Policies relating to water are now delivered by the regulatory methods produced to implement the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2013). The Controlled Activities Regulations (CAR) means that it is an offence to undertake the following activities without a CAR authorisation:

- discharges to all wetlands, surface waters and groundwaters (replacing the Control of Pollution Act 1974);
- disposal to land (replacing the Groundwater Regulations 1998);
- abstractions from all wetlands, surface waters and groundwaters;
- impoundments (dams and weirs) of rivers, lochs, wetlands and transitional waters; and
- engineering works in inland waters and wetlands.

11.9 Any proposed access track water crossings would require authorisation under CAR 2011. The SEPA Position Statements on Culverting of Watercourses (WAT-PS-06-02)[1] and Sediment Management (WAT- SG-78)1 have also been taken into account within this assessment, along with the supporting guidance provided in the Good Practice Guide - River Crossings (WAT-SG-25)[2].

The Fresh Water Fish Directive and its Transposition into National Law

11.10 The Water Environment (Register of Protected Areas) (Scotland) Regulations 2004 includes water bodies designated under the Fresh Water Fish Directive (78/659/EEC). The purpose of the Fresh Water Fish Directive is to protect or improve the quality of running or standing fresh waters which support or may become capable of supporting fish life[(3)]. The WFD's overall objective is to bring about the effective co-ordination of water environment policy and regulation across Europe, and eventually the Freshwater Fish Directive will be repealed by this legislation[(3)].

National Legislation and Policy

Water Quality Standards and Objectives

11.11 The water quality of Scotland's rivers is classified by SEPA, which has developed a classification scheme for surface waters following the requirements of the Water Framework Directive, as part of the river basin management plans (RBMP). This classification scheme assesses the quality of aquatic ecosystems within rivers, lochs, estuaries and coastal waters and the extent to which they have been adversely affected.

1 Available at: http://www.sepa.org.uk/water/water_regulation/guidance/engineering.aspx
2 Available at: http://www.sepa.org.uk/water/water_publications.aspx
3 SEPA and Freshwater fisheries (http://www.sepa.org.uk/water/protected_areas/freshwater_fisheries.aspx)

11.12 The scheme assesses the condition of each river, loch, estuary and coastal water and assigns it a 'status' from high, good, moderate, poor to bad. If a water body is classified as high or good status, then it has a healthy ecology which deviates only slightly from natural conditions. Such a water body is an important natural heritage asset and can support a wide range of uses such as recreation, fishing and drinking water supply. If a water body is classified as moderate, poor or bad, then the ecology is adversely affected and the range of uses which can be supported is reduced.

11.13 As part of the river basin management plans, waterbody data sheets have been published by SEPA containing details of the current waterbody classification, current pressures on the waterbody and measures to address these and classification objectives for 2015, 2021 and 2027.

Water Supply Regulations

11.14 In Scotland, drinking water standards are set down by law in The Water Supply (Water Quality) (Scotland) Regulations 2001, which mirror the requirements of the revised European Drinking Water Directive (Council Directive 98/83/EC). Private water supplies are regulated by the Private Water Supplies (Scotland) Regulations 2006 which transpose the revised European Drinking Water Directive (Council Directive 98/83/EC). The overriding objective of these regulations is to ensure the provision of clean and wholesome drinking water and deliver significant health benefits to those using such supplies.

11.15 Drinking Water Protected areas under The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013, identifies bodies of surface water and bodies of groundwater in the Scotland River Basin District which are used, or are intended to be used, for the abstraction of drinking water. This is done by reference to maps which identify the bodies of surface water and groundwater which either provide more than 10 cubic metres of drinking water per day, or serve more than 50 persons, or are intended for such use.

Pollution Prevention Guidelines

11.16 SEPA, working with the Environment Agency and the Northern Ireland Environment Agency, has prepared a range of Pollution Prevention Guidance Notes (PPGs) to set out best practice and indicative mitigation measures to minimise potential impacts of construction works. The following PPGs have been taken into account in this assessment:

- PPG01: General guide to the prevention of water pollution;
- PPG05: Works in, near or liable to affect watercourses;
- PPG06: Working at construction and demolition sites; and
- PPG21: Pollution incident response planning.

11.17 The SEPA 'Land Use Planning System Guidance Note 4: Planning advice on wind farm developments includes guidelines upon assessing impacts on groundwater and associated receptors, such as groundwater abstractions and groundwater dependent terrestrial ecosystems (GWDTEs).

11.18 The vulnerability of groundwater to pollution from surface contamination is dependent on the nature of the contaminant, the presence and nature of the overlying soils and drift deposits, the geology and the depth to the water table. This will determine the rate at which a contaminant can migrate into the water. SEPA's approach to controlling and preventing the pollution of groundwater is set out in its Groundwater Protection Policy for Scotland (SEPA Policy No.19).

11.19 The Water Environment (Oil Storage) (Scotland) Regulations 2006 provides a statement upon requirements for oil and chemical storage facilities.

Policy Relating to Planning and Flooding

11.20 The Scottish Planning Policy (2010) provides a statement of Scottish Government policy on land use planning. This contains guidance on Flooding and Drainage for development within areas of flood risk, including the responsibilities of planning authorities in regulating and controlling development in such areas, in order to prevent increased risk of flooding in the future. The Guidance emphasises the need to apply sustainability principles to the prevention of flooding and the control of future development.

11.21 Planning Advice Note 61 promotes the use of Sustainable Drainage Systems (SuDS). SuDS provide more natural approaches to run-off management and when incorporated into developments, help to prevent increases in flood or water pollution risk downstream of the wind farm developments. The Controlled Activities Regulations provide regulation under General Binding Rules (GBRs) 10 and 11 for SuDS.

11.22 Scottish Government renewable energy policy and targets are a material consideration, and there is a clear commitment from the Scottish Government to support renewable energy developments as set out in Scottish Planning Policy (SPP) (2010). SPP also states that planning authorities should support the development of wind farms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed.

Development on Peatlands

11.23 The Scottish Government's ambition is that by 2020, renewable sources generate the equivalent of 100% of Scotland's electricity consumption[4]. Considering the carbon cost of constructing a wind farm development with the carbon savings attributable to the wind farm, has resulted in all new planning applications using the Scottish Government's published method for assessing carbon losses and savings. When constructing a wind farm on peatlands, it is assumed that good management practice and guidance would be followed to avoid catastrophic losses of carbon. The following guidance has been considered:

- SEPA 2012. Land Use Planning System SEPA Guidance Note 4 Planning guidance on wind farm developments;

4 The Scottish Government Wind Farms and Carbon (available at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/17852-1/CSavings)

- Scottish Renewables and SEPA 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste;
- Calculating Carbon Savings from Wind Farms on Scottish Peatlands – A new Approach (Nayak et al., 2008; Nayak et al., 2010 and Smith et al., 2011);
- Joint Nature Conservation Committee 2011. JNCC Report No. 445 Towards an assessment of the state of UK Peatlands;
- SNH, SEPA, Scottish Government and The James Hutton Institute 2011. Guidance Developments on Peatland: Site Surveys;
- Scottish Renewables, SNH, SEPA, Forestry Commission Scotland (FCS) 2010. Good Practice During Wind Farm Construction; and
- SNH/FCS 2010. Floating Roads on Peat.

Regional and Local Policy

11.24 Under the terms of the Planning Acts and associated Regulations, all Councils are required to prepare and keep up-to-date a Development Plan covering their administrative areas. The Development Plan provides the land use planning policy framework for their administrative areas. The current Development Plan for the area is The Highland-wide Local Development Plan (2012). The policies of relevance are:

- Policy 55 Peat and Soils;
- Policy 63 Water Environment;
- Policy 64 Flood Risk; and
- Policy 67 Renewable Energy Developments.

11.25 The following Moray Council Local Plan policies are also relevant:

- Local Plan Policy EP4 – Private Water Supply;
- Local Plan Policy EP5 – Service Water Drainage Sustainable Urban Drainage Systems;
- Local Plan Policy EP6 – Water Bodies; and
- Local Plan Policy EP8 – Pollution.

Issues Identified during Consultation

11.26 Table 11.1 identifies relevant responses on the scope of the impact assessment raised during EIA scoping and consultation processes. The scoping responses from consultees are collated within the ECDU Scoping Opinion for the Proposed Wind Farm Development.

Table 11.1: Issues Identified during Consultation

Consultee	Issue	Where/How this is Addressed
SEPA	▪ Disruption to wetlands, especially groundwater dependant terrestrial ecosystems - National Vegetation Classification should be completed for any wetland habitats identified. The ES should clearly demonstrate how the layout and design of the proposal (including any associated borrow pits, hard standing and roads) avoid impact on groundwater dependant terrestrial ecosystems.	▪ A National Vegetation Classification survey, identifying groundwater dependant terrestrial ecosystems (GWDTE has been conducted. The infrastructure design has minimised encroachment into GWDTE and their zone of contribution as detailed in this chapter.
	▪ Disturbance and re-use of excavated peat - Where the proposed infrastructure will impact upon peatlands, a detailed map of peat depths (this must be to full depth) should be submitted. An overall approach of minimisation of peatland disruption should be adopted.	▪ A peat depth survey has been conducted. The infrastructure design has minimised encroachment into areas of peat over 1.5 m. **Technical Appendix 11.1** outlines the carbon losses and savings for the Proposed Wind Farm Development.
	▪ Engineering activities in the water environment - In order to meet the objectives of the Water Framework Directive of preventing any deterioration and improving the water environment, developments should be clearly designed to minimise engineering activities in the water environment wherever possible.	▪ The infrastructure and track design has ensured there are no watercourse crossings (although some land drains will require to be crossed).
	▪ Existing groundwater abstractions - Roads, foundations and other construction works associated with large scale developments can disrupt groundwater flow and impact on groundwater abstractions.	▪ A private water supply risk assessment has been conducted (**Technical Appendix 11.2**) and infrastructure design minimised to prevent encroachment into abstraction zones of contribution.
	▪ Water abstraction - Where water abstraction is proposed we request that the ES details if a public or private source will be used.	▪ A water abstraction is not proposed. Concrete would be brought onto site ready mixed.
	▪ Pollution prevention and environmental management - identify all aspects of site work that might impact upon the environment, potential pollution risks associated with the proposals and identify the principles of preventative measures and mitigation.	▪ Detailed pollution prevention mitigation is presented in paragraph 11.135 and 11.139. **Technical Appendix 5.1** (Draft Construction & Decommissioning Method Statement (CDMS)) details the schedule of mitigation.
	▪ Borrow Pits - Where borrow pits are proposed, information should be provided regarding their location, size and nature. In particular, details of the proposed depth of the excavation compared to the actual topography and water table should be submitted.	▪ There are no borrow pits proposed.

Table 11.1: Issues Identified during Consultation		
Consultee	**Issue**	**Where/How this is Addressed**
SNH	▪ The proposal is sited within the catchment of the River Findhorn which is important for salmonid species and freshwater invertebrates, mitigation measures should be included in the ES to ensure that the water quality of this river is maintained. ▪ Peatland - Where peat is likely to be present, thorough peat probing should be carried out at the proposed turbine locations, tracks and other infrastructure, and used to inform a peat slide risk assessment ▪ An assessment of impacts of hydrological changes, particularly related to groundwater, on habitats should also be included	▪ See SEPA Pollution prevention and environmental management and **Chapter 8: Ecology**. ▪ Refer to above SEPA response for details on addressing peat disturbance (**Technical Appendix 5.3 and 5.4**). ▪ Refer to above SEPA response for details on groundwater dependent terrestrial ecosystems and National Vegetation Classification.
Marine Scotland	▪ It is recommended that construction avoids water bodies wherever possible. If construction is to be carried out near watercourses, a buffer zone of at least 50m should be established. ▪ Peat slides can have a direct impact on fisheries and peat disturbance can have indirect effects on water quality, therefore all construction should avoid areas of deep peat, where this is not possible appropriate mitigation measures should be put in place. Natural peat drainage channels should be preserved throughout the development; excavated material should not be stock piled in areas of unstable peat; concentrated water flows onto peat slopes should also be avoided. ▪ The propensity of the development site to flooding, prior to any construction activities, should be considered. Drainage throughout the proposal should be designed such that it does not alter surface water runoff leading to a reduction in baseflows or influence the magnitude and/or frequency of flooding. Such changes in the hydrological regime can have a large impact on fisheries.	▪ A 50 m exclusion zone around all 1:10,000 scale mapped surface waterbodies has been applied. ▪ See above SEPA response for details on addressing peat disturbance (**Technical Appendix 5.3 and 5.4**). ▪ The flood risk of the Site has been assessed within this chapter in paragraph 11.57.
The Highland Council	▪ Identify likely significant effects of the development on the local geology including aspects such as borrow pits, earthworks, site restoration and the soil generally including direct effects and any indirect. ▪ Consider the risks of engineering instability relating to presence to peat on the site as well as the issue of carbon balance ▪ Address the nature of the hydrology and hydrogeology of the site, and of the potential impacts on water courses, private supplies and the aquatic interests within local watercourses. The assessment should then lead on to appropriate mitigation being identified with measures proposed to prevent contamination or physical disruption	▪ There are no borrow pits proposed. Disturbed ground and site restoration are addressed within **Technical Appendix 5.1** (Draft Construction & Decommissioning Method Statement (CDMS)), detailing the schedule of mitigation. ▪ See above SEPA response for details on addressing peat disturbance (**Technical Appendix 5.3 and 5.4**). ▪ See above SEPA response on PWSRA. Detailed pollution prevention mitigation is presented in paragraph 11.135 and 11.139.
Moray Council	▪ Sustainable Drainage Systems - Surface water from development should be dealt with in a sustainable manner that avoids flooding and pollution and promotes habitat enhancement and amenity. All sites should be drained by a SuDS system or equivalent. ▪ Proposals for development in areas considered to be at risk from flooding will only be permitted where a flood risk assessment to comply with the recommendations of National Guidance and be satisfactory to both SEPA and the Council is provided by the applicant. The assessment must demonstrate that any risk from flooding can be satisfactorily mitigated without increasing flood risk elsewhere.	▪ See above SEPA and Marine Scotland responses.

Assessment Methodology

11.27 This section presents the assessment methodology used within this chapter. The Baseline Characterisation section first presents the methodology for assessment of the baseline environment with regard to geology, hydrology and hydrogeology. The Method of Assessment section then presents the methodology used for the definition of the potential impacts, mitigation measures and final residual impacts. Finally, the significance of the impact is defined using the criteria presented within the Significance Criteria section. Note that the residual impacts on the hydrological regime may have consequences for the aquatic ecology of the Site, which is assessed in **Chapter 8: Ecology**.

Baseline Characterisation

11.28 Evaluation of the existing baseline environment has been assessed through a combination of a desk-based study, site visit and consultation with SEPA, The Highland Council (THC) and Moray Council. Hydrology naturally falls into sub-catchments (of which there may be more than one draining a site). The baseline hydrogeology, surface hydrology, water resource utilisation and water quality are considered for the Site and each sub-catchment draining the Site. The sub-catchments are shown in Figure 11.2.

11.29 The desk based analysis considered the following sources of information:

- OS mapping at 1:50,000, 1:25,000 and 1:10,000 scales;
- British Geological Survey, 1978. 1:50,000 Sheet 84E Geology Edition (Drift);
- British Geological Survey, 1978. 1:50,000 Sheet 84E Geology Edition (Solid);

- Scotland & Northern Ireland Forum for Environmental Research 1:100,000 Groundwater Vulnerability mapping; and
- Data collation from relevant organisations (as presented within Table 11.2).

Table 11.2 Data Collection Summary

Consultee	Contact Name	Data Requested	Data Provided	Date Response Received
The Highland Council	Angus Hogg (Environmental Health)	Private water supplies	Provided details of locations of private water supplies situated within the sub-catchments draining the Site	29.06.2012
SEPA (Freedom of Information Request)	Cara Everitt (Access to Information Co-ordinator)	Controlled Activities Regulations	A list of CAR licences issued within the vicinity of the Site.	26.06.2012
SEPA	RBMP (Waterbody Data Sheets)	Water quality data	Waterbody status, pressures and targets.	30.05.2012

11.30 A site visit was conducted on 19th and 20th July 2012, which involved a walkover of the Site. All properties identified as requiring a private water supply risk assessment were visited on 13th and 14th May 2013

11.31 The sensitivity of the sub-catchment hydrology has been assessed using the criteria defined in Table 11.3.

Table 11.3: Receptor Sensitivity

Receptor Sensitivity	Criteria
High	The receptor has low capacity to absorb change without fundamentally altering its present character. ▪ The receptor is of very high environmental value and/or National or International ecological status (i.e. SSSI, SAC, SEPA High waterbody status). ▪ Environmental equilibrium is precarious and highly sensitive to change. ▪ Designated salmonid fishery or for other freshwater ecological interests (e.g. freshwater pearl mussels). ▪ Active floodplain. ▪ Abstractions for public water supply; or abstractions for private water supply supplying more than 10 m^3/day for human consumption or serves more than 50 persons [5]. ▪ Watercourse widely used for activities relating to water quality (e.g. fisheries, swimming, etc.).
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character. ▪ The receptor has some environmental importance. Local or Regional ecological status (i.e. SEPA Good or Moderate waterbody status or target objective).

5 The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013

Table 11.3: Receptor Sensitivity

Receptor Sensitivity	Criteria
	▪ Environmental equilibrium is stable and copes well with natural fluctuations. ▪ Designated cyprinid fishery, salmonids may be present and locally important for fisheries. ▪ Contains some flood alleviation features. ▪ Abstractions for private water supplies supplying less than 10 m^3/day for human consumption or serves less than 50 persons [5]. ▪ Watercourse is not widely used for activities relating to water quality.
Low	The receptor is tolerant of change without detriment to its character and is of low environmental value. ▪ Low ecological status (i.e. SEPA Poor or Bad waterbody status and not subject to higher target objectives). ▪ Environmental equilibrium is stable and resilient to changes greater than natural fluctuations. ▪ Fish sporadically present or restricted. ▪ Does not contain any flood alleviation features. ▪ No abstractions for private water supply. ▪ Watercourse is not used for activities relating to water quality.

Method of Assessment

11.32 Once the sensitivity of the baseline environment had been assessed, a hydrological constraints map was developed, to ensure that these constraints were incorporated into the design of the infrastructure layout for the Proposed Wind Farm Development.

11.33 The assessment of impacts on the surface water and groundwater baseline environment of the final design was then conducted using the following process:

- examination of infrastructure design, and construction and operational methodologies.
- identification of potential significant impacts, differentiated between short term construction impacts and long term operational and design impacts for each direct and indirect receptor.
- for each potential impact, identification of mitigation measures to avoid, minimise or remedy any adverse impacts and enhance any beneficial impacts.
- identification of residual impacts following the implementation of mitigation measures, differentiating between short term construction impacts and long term operational and design impacts; and
- Define the residual magnitude of change using the criteria presented in Table 11.4.

11.34 It should be noted that the layout of the turbines, and hence tracks and cables, would be subject to a 50 m micrositing allowance. The assessment of impacts presented within this chapter has been based upon the layout defined in **Chapter 4: Description of Development**. Any micrositing changes would respect the exclusion zones defined within this chapter such that no infrastructure would be moved to the extent that impacts would be any greater than those reported in this chapter.

Table 11.4: Magnitude of Change	
Magnitude	**Change to the Baseline Environment**
Large	▪ Long term loss of resource and/or quality; partial loss of or damage to key characteristics, features or elements.
Moderate	▪ Long term measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements; or ▪ Short term loss of resource and/or quality; partial loss of or damage to key characteristics, features or elements.
Small	▪ Long term very minor loss or detrimental alteration to one or more characteristics, features or elements; or ▪ Short term measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
Negligible	▪ Short term very minor loss or detrimental alteration to one or more characteristics, features or elements.
No Change	▪ No loss or alteration of characteristics, features or elements.

Significance Criteria

11.35 The final significance of the residual impacts upon the baseline environment is defined as a function of the sensitivity of receptors and the magnitude of change. The impact assessment will be undertaken in accordance with the Electricity Works (Environmental Impact Assessment) 2000 (Scotland) Regulations (as amended). The significance criteria in Table 11.5 will be followed, which is based upon the principles of the Institute of Ecology and Environmental Management's (IEEM) guidelines for ecological impact assessment in the United Kingdom[6].

11.36 The final significance of the residual impacts upon the baseline environment is defined as a function of the sensitivity of receptors and the magnitude of change to the baseline conditions, as presented in Table 11.5. **Moderate** or **Major** impacts are deemed significant in terms of the EIA regulations. Impacts that are of a Minor, Negligible change or result in No Change are judged to be not significant. Differentiations between categories in Table 11.5 are based upon professional judgement. A **Moderate** or **Major** change to a receptor as a result of an impact would require mitigation, whereas a Minor change, Negligible change or No Change would not require mitigation; although mitigation may be provided as part of standard good practice in construction and operation.

Table 11.5: Significance Criteria					
	Magnitude of Change				
Site Sensitivity	**Large**	**Moderate**	**Small**	**Negligible**	**No Change**
High	Major	Moderate	Minor	Negligible	None
Medium	Moderate	Minor	Negligible	None	None
Low	Minor	Negligible	None	None	None

6 IEEM (2006) Guidelines for Ecological Impact Assessment in the UK.

Baseline Conditions

Current Baseline

11.37 The current baseline environmental conditions are described in relation to the geology, hydrology and hydrogeology of the Site, and address the following issues:

- the superficial and solid geology underlying the Site, the overlying soils and hence, the hydrogeology of the Site;
- the surface hydrology and Site drainage to include the sub-catchments draining the Site;
- the water quality of the watercourses draining the Site and sub-catchments; and
- the water resource utilisation within the Site and draining sub-catchments.

11.38 The future baseline under a "do nothing" scenario is then discussed.

Geology, Hydrogeology and Soils

11.39 This section has been sub-divided into solid geology, drift geology and soils, each considering the associated hydrogeology for the Site. The final groundwater vulnerability is then presented. The geology of the Site is mapped with the British Geological Survey (BGS) 1:50,000 Solid and Drift Geology Edition Sheet 84E map (published in 1978).

Solid Geology

11.40 The solid strata within the Site are comprised of approximately half granite and half metamorphic impermeable rock (Figure 11.1) [7,8]. The western extent of the Site is dominated by Ardclach Pluton Granite (ADCL – GRAN) while the eastern extent is composed of metamorphosed bedrock of Grampian Group and Dava Succession (GRDA-META) from the Moine Supergroup.

11.41 As the Site consists of impermeable granite and metamorphic rock it is unlikely any significant volumes of groundwater will be present. It is likely than any localised groundwater will follow any fractures within the bedrock. It is possible that some groundwater may occur at the boundary between the metamorphic rock and granite rock through the centre of the Site, running north to south. This is confirmed by the 2004 SEPA and Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) Baserock Aquifer Map[9], classifying the bedrock underlying the Site as having predominantly fracture flow of low productivity in terms of groundwater abstraction.

Superficial Geology

11.42 The majority of the Site is overlain with Devensian Till (Diamicton) located in the central and northern extents of the Site, with areas of peat along the eastern boundary. The southern extent of the Site comprises a combination of peat and glaciofluvial Ice-Contact deposits. There is one small area of exposed bedrock near the centre of the Site on the peak of Cairn

7 The BGS Lexicon of Named Rock Units (http://bgs.ac.uk/Lexicon/)
8 BGS 1:50 000 Solid and Drift Geology Edition Sheet 84E
9 SNIFFER (2004) Development of a groundwater Vulnerability Screening Methodology for the Water Framework Directive

Duhie.

11.43 The areas of till in the north and large expanse of glaciofluvial deposits in the south of the Site may harbour some superficial groundwater lenses connecting with any underlying localised groundwater. The areas of peat in the southern and eastern extents of the Site are unlikely to contain superficial groundwater. This is confirmed by the 2004 SEPA and SNIFFER Superficial Aquifer Map[9] which indicates intergranular flow of low to high productivity in the southern extents of the Site.

Soils

11.44 The Hydrology of Soil Types classification indicates the majority of the Site is overlain by peat, with some areas of mineral soil [10]. The mineral soils located within the Site are likely to comprise gleyed layers at varying depths. The peat soils are located across the entire Site with a varying degree of saturation. Due to the presence of mapped peat deposits, a survey of peat depths was conducted to establish the extent and depth of the peat soils across the entire Site.

11.45 A Phase 1 peat depth survey was undertaken by MacArthur Green Ltd in 2012 (See **Technical Appendix 8.3**) where a grid of sample points located at intervals of 100 m was mapped across the Site, totalling 692 peat depth probes. 12 % (87) of the peat probes recorded peat depths greater than 2.0 m, with the maximum thickness of peat recorded as 5.15 m. However, the majority of the survey recorded shallow peat depths; 74 % (513) of the total probes recorded peat with a depth less than 1.0 m. A Phase 2 peat depth survey was conducted at 50 m intervals along centre lines of tracks and roads and 10 m intervals at turbine locations, substation, construction compounds, meteorological masts and storage area. Full details of the survey are presented in **Technical Appendix 8.3**.

11.46 The MacArthur Green Ltd peat depth probing survey also confirmed the presence of superficial Glacial Till (Diamicton) underlying the peat.

Groundwater Vulnerability

11.47 The majority of groundwater in the vicinity of the Site is defined by SEPA and SNIFFER as level 4b to 4d on their vulnerability scale, with 5 being the most vulnerable and 1 the least. Category 4 infers groundwater is vulnerable to those pollutants not readily adsorbed or transformed [9]. As previously mentioned, the majority of the Site is comprised of till and glaciofluvial superficial deposits which have the capacity to harbour superficial groundwater. It is likely that there may be some attenuation in areas where mineral soils overlie till or glaciofluvial drift.

Surface Hydrology and Site Drainage

Surface Water Features

11.48 The Proposed Wind Farm Development is located within the watershed of the River Findhorn. The northern and western extents of the Site directly drain to the River Findhorn via two sub-catchments (displayed in Figure 11.2):

- Sub-catchment A (Stripe of Little Lyne and Stripe of Muckle Lyne) is 6.5 km^2 in size. 49 % of sub-catchment A lies within the Site which drains northwards via two main tributaries; Stripe of Little Lyne and Stripe of Muckle Lyne. These tributaries confluence at NH976459, before flowing approximately 1.2 km northwards to the River Findhorn at NH973467. There are a few small lochans draining to the Stripe of Muckle Lyne, located within this sub-catchment in the northern extent of the Site. 48 % of the Site lies within sub-catchment A, which is equivalent to 3.2 km².
- Sub-catchment B (Tomnarroch Burn) is the largest of the sub-catchments with an area of 9.4 km^2. 21 % of the catchment is occupied by the Site. 30 % of the Site (equivalent to 2.0 km²) lies within sub-catchment B which drains the western extent of the Site via Tomnarroch Burn to its confluence with the River Findhorn at NH960453.

11.49 The eastern extents of the Site drain to Dorback Burn, which flows northwards to its confluence with the River Findhorn at NJ001499. Dorback Burn drains the Site via four sub-catchments:

- Sub-catchment C (Burn of Lochantùtach) drains the mostly southerly extent of the Site via the Burn of Lochantùtach and its tributaries, in an east/north easterly direction to Dorback Burn. The catchment is 6.4 km^2 in size and 18 % of sub-catchment C is occupied by the Site. 1.2 km² (equivalent to 18 %) of the Site lies within sub-catchment C. Lochan Tùtach is situated outside of the Site to the south.
- Sub-catchment D (unnamed) is a small catchment (1.1 km^2) containing a small tributary of Dorback Burn which drains from the summit of Cairn Duhie. Only 0.2 km^2 (equivalent to34 %) of the Site is located within this catchment. 20 % of sub-catchment D's total area is occupied by the Site.
- Sub-catchment E (unnamed) comprises a number of small tributaries which drain directly into Dorback Burn. However, there is not a significant waterbody which encompasses these small tributaries for which a sub-catchment boundary can be defined. Therefore, sub-catchment E is not a true catchment, but will be referred to as sub-catchment E for the purposes of defining the surface water features draining the Site that are not occupied by sub-catchments D and F, totalling an area of 0.9 km². 2 % of sub-catchment E is occupied by the Site, with only 0.01 km² of the Site located within sub-catchment E.
- Sub-catchment F (unnamed), located to the north of sub-catchment E, is another small catchment (area of <1.0 km²) draining directly into Dorback Burn. 8 % of this catchment is occupied by the Site. This is equivalent to <0.1 km^2 of the Site located within sub-catchment F.

11.50 There are a series of natural springs, channels and drains located throughout the sub-catchments and Site. The sub-catchments draining the Proposed Wind Farm Development are shown in Figure 11.2.

10 Boorman, D. B., Hollis, J. M. and Lilly, A. 1994. Hydrology of Soil Types: a Hydrologically-based Classification of the Soils of the United Kingdom. IH Report 126

Topography and Land Use

11.51 The Site is located approximately 15 km south east of Nairn and 13.5 km north of Grantown-on-Spey and is very rural in nature. The eastern extent of the Site is close to the district boundary between THC and Moray Council while the western extent follows the A939 road. The northern extent skirts the edge of the (coniferous) forested areas of New Inn Wood and Hill of Fevene. The southern boundary lies between Lochan Tùtach and a tributary of Burn of Lochantùtach. The Site is generally flat with 89 % of the Site at a gradient less than 8 %, ranging from 198 m (Above Ordnance Datum) AOD to 312 m AOD at the summit of Cairn Duhie located just off-centre of the Site.

11.52 The site visit (19th and 20th July 2012) and mapping revealed the Site is predominately vegetated with rough grassland and heathland with isolated areas of mixed woodland, sphagnum mosses and moorland heath spotted orchids. The southern extents of the Site near Lochan Tùtach and the northern extents near Muckle Lyne are also characterised by acid grasses and flush areas, bog marshes, interspersed with birch and pine trees. The Site is mostly used for low-level rough grazing of cattle and sheep and occasional recreational grouse shooting. There are no settlements within the Site and any settlement within the sub-catchments comprises isolated dwellings, farmhouses and the small village of Ferness, located in sub-catchment B. The site visit identified a single short existing track within the Site running from the north western corner of the Site boundary and into the Site, parallel to New Inn Wood.

Flow Characteristics

11.53 The annual average rainfall over the Site is 824 mm. The seasonal distribution of the rainfall is typical for the east coast of Scotland, with average monthly rainfall lower during the summer months and higher during the winter months. Prevailing climatic systems approach from the North Sea and migrate towards the highlands of the Cairngorm National Park. The potential evaporation decreases slightly across the Site from north to south with an average of 405 mm. Given the low permeability of the solid geology and high storability of any peat soils across the Site, it would be expected that significant soil moisture deficits, which would limit evaporation, are unlikely to build up in most years. The combination of impermeable bedrock and permeable superficial deposits of till and glacial sand and gravel, along with the presence of peat across the Site results in an average to dampened response to runoff.

11.54 There is one gauging station downstream of the Site on the River Findhorn that has been considered for use as an analogue to estimate the flow statistics; the River Findhorn at Forres (station number 7002). Ideally an analogue catchment would be natural (i.e. contain no major artificial influences), lie upstream or downstream of the ungauged catchment (termed connected), be geographically close and hence have the same climatic regime, receive similar rainfall and be hydrogeologically similar. The River Findhorn at Forres (7002) gauging station is not suitable as an analogue to estimate flow statistics within the ungauged sub-catchments (A - F), as these represent less than 10 % of the gauged catchment.

11.55 Table 11.6 presents the estimates of the mean flow and 95th exceedence percentile flow (Q95) determined using the LowFlows software system [11], as well as the median annual flood determined using the Flood Estimation Handbook CD-ROM software [12].

Table 11.6: Sub-catchment Flow Characteristics

Sub-catchment	NGR Outlet	Watercourse	Area (km^2)	Mean Flow (m^3/s)	Q95 (%MF)	Median Annual Flood (m^3/s)
A	NH973466	Stripe of Little Lyne/ Stripe of Muckle Lyne	6.49	0.09	20.43	1.95
B	NH960452	Tomnarroch Burn	9.42	0.139	19.71	2.48
C	NH994421	Burn of Lochantùtach	6.42	0.099	18.18	1.83
D	NH997433	Unnamed	1.13	0.02	23.53	0.50
E	n/a	Unnamed	0.86	n/a	n/a	n/a
F	NH998444	Unnamed	0.96	0.0143	18.88	0.57
GSTN 07002 Findhorn @ Forres	NJ018583	Findhorn	781.9	19.37	16.83	312.0

11.56 Any reduction in baseflows or a change in the magnitude and frequency of flood peaks in the rivers as a result of the Proposed Wind Farm Development are critical issues with regard to flood risk, water supplies and aquatic ecology. The Site (6.66 km²) encompasses a relatively high proportion of the sub-catchments draining the Site, which drain a total area of 25.29 km². Subsequently, the surface water hydrology and drainage may potentially be altered by construction activities at the sub-catchment scale.

Flooding

11.57 The 1:200 year flood envelope of the SEPA Interactive Flood Map [13] does not highlight any areas within the Site at risk of flooding from the surface water features draining the Site. However, the resolution of the map does not account for smaller catchments and burns with a catchment area of less than 3 km^2 and therefore, there could potentially be other extents of the Site within close proximity to surface water features which may be at risk of flooding [13]. These include the lochans and pools in the Site near Stripe of Muckle Lyne and the watercourse north of Sidhean a' Tutach.

11.58 Downstream of the Site in sub-catchment A, the Burn of Fevene drains the Stripe of Muckle Lyne and Stripe of Little Lyne. The Burn of Fevene does show areas of flooding along its course from its mouth to the property of Airdrie Mill. In addition to the Burn of Fevene, Tomnarroch Burn (which drains the western extents of the Site into sub-catchment B) is also highlighted as being at risk from flooding along its entire length to the River Findhorn. The

11 Young A. R., Grew R. and Holmes M. G. R., (2003). Low Flows 2000: A national water resource assessment and decision support. Water Science and Technology, 48 (10).

12 Reed, D. (1999). Flood Estimation Handbook. Institute of Hydrology.

13 1:200 year flood envelope of the SEPA Interactive Flood Map (http://www.sepa.org.uk/flooding/flood_map/view_the_map.aspx)

River Findhorn (which is confluent with the draining sub-catchments) is also highlighted as at risk from flooding. Similarly, the Dorback Burn and the Burn of Lochantùtach (sub-catchment C) show flooding restricted to the watercourses. However, in relation to the Site, flooding is likely to be localised.

Artificial Land Drainage

11.59 The Ordnance Survey 1:10 000 scale map indicates that there are a number of small drains flowing out of the western extent of the Site. The site visit confirmed the presence of drains along the western boundary, which are drainage ditches for the A939. The site visit further identified a significant number of land drains within the Site, as displayed on Figure 11.4 and Figure 11.6.

11.60 The Burn of Lochantùtach bisects the southern extent of the Site west to east, before flowing north east to the Dorback Burn. There are numerous land drains which flow from the Burn of Lochantùtach south into Lochan Tùtach (Figure 11.6). A combination of aerial mapping and the Site walkover identified the number of drains flowing into Lochan Tùtach to be 11; of a straight north to south direction, narrow width and depth (approximately 0.3 m x 0.5 m, respectively).

11.61 North of the Burn of Lochantùtach, there are four land drains flowing in a north west to south east direction in close proximity to the A939 and flush at the source of the Burn of Lochantùtach. Immediately east, there are a number of additional land drains (seven in total) which change direction and run parallel to the Burn of Lochantùtach, flowing west to east.

11.62 The northern extents of the Site also contained a number of artificial land drains. These included a series of narrow, regularly spaced drains running east to west from the Hill of Fevene into the Stripe of Muckle Lyne. At the time of the site visit a large area of the Hill of Fevene forestry was being felled, just north west of the Site. In the north east of the Site near an area of unnamed forestry, the site visit also identified a series of unmapped peat cuts, running west to east with drying peat and fresh peat cuts visible, as displayed in Figure 11.6.

Water Quality

11.63 The waterbody data sheets developed by SEPA as part of the river basin management plans [14] contain a summary of the waterbody, including details of the current waterbody classification, current pressures, measures to address these and future classification objectives.

11.64 The middle reaches of the River Findhorn (Tomatin to Dorback Burn) waterbody catchment comprises an overall status of 'Good', with an ecological status of 'Good' and a chemical status of 'Pass'. Currently, the River Findhorn does not suffer from any pressures and has a target objective of good for 2015, 2021 and 2027. There are no defined future objectives. None of the waterbodies draining sub-catchments (A and B) have individual data sheets, thus form part of the River Findhorn (Tomatin to Dorback Burn) waterbody.

11.65 Sub-catchments C – F do not have an individual river basin management plan, but Dorback Burn (which receives direct drainage from catchments C – F) has an overall status of 'Bad', with an ecological status of 'Bad' and a chemical status of 'Pass'. The target objective for Dorback Burn is good in 2015, 2012 and 2027, and currently does not suffer from any pressures. Copies of the SEPA datasheets are provided in **Technical Appendix 11.4**.

11.66 Water quality within the sub-catchments may be affected by the construction and operation of the Proposed Wind Farm Development. Due to the rural nature of the area, current issues with water quality are predominantly the result of diffuse pollution (associated with animal husbandry, agricultural practices and sewage disposal).

Water Use

11.67 The following sections present the details of water use within the catchments draining the Site. The major water uses within the sub-catchment draining the Site are abstractions for private water supplies (PWS). SEPA has confirmed that there are no Controlled Activities Regulations abstraction licences within the Site. There are a number of designated sites downstream of the Site and GWDTE, protected under the Water Framework Directive, have been identified within the Site.

Drinking Water Protection Zones

11.68 The Site is within the extent of both the Findhorn bedrock and localised sand and gravel aquifers and the Dorback Valley Sand and Gravel Groundwater Drinking Water Protection Zone, which are designated under the Drinking Water Directive. Both the Findhorn and Dorback Valley groundwater aquifers do not currently suffer from any pressures and have a 'Good' target status by 2015 [14]. The western and northern extents of the Site are bordered by the Newlands of Fleenas Sand and Gravel Drinking Water Protection Zone, which also does not currently suffer any pressures.

Private Water Supplies

11.69 THC and Moray Council did not list any properties served by a private water supply (PWS) within the Site, but did identify 26 (THC) and 20 (Moray Council) properties on a PWS within close proximity of the Proposed Wind Farm Development. It is notoriously difficult to identify all PWSs in any area, particularly one as rural as the Site. For example, records usually identify the property rather than the location and type of the PWS source. In addition, the sources can be small springs that are obscure and hard to locate without detailed local knowledge. Furthermore, it is not compulsory for abstractors of private water for domestic use to notify Local Council Environmental Standards departments. It is therefore possible that other private water supply abstractions exist in the vicinity of the Site, and consequently a number of such additional properties (25 in total) within the drainage pathways of the Site were also identified during the desktop study. Although these properties were not identified by THC and Moray Council, it is possible that they may use a

14 SEPA Draft River Basin Management Plans: Web Mapping Application PDF downloads for the River Findhorn (Tomatin to Dorback Burn), Dorback Burn/River Divie, Findhorn bedrock and localised sand and gravel aquifers, Dorback Valley Sand and Gravel aquifers, Newlands of Fleenas Sand and Gravel (*http://gis.sepa.org.uk/rbmp/MapViewer.aspx*)

PWS.

11.70 A Private Water Supply Risk Assessment (PWSRA) was conducted to consult with all residents of properties potentially using a PWS within the drainage pathways of the Site, to determine if those properties receive their water supply from either mains or private sources. Of the 71 properties identified, 28 properties warranted a detailed risk assessment based upon the location and topography with respect to the Proposed Wind Farm Development. The 71 PWS properties identified within the desk-based study and their requirement for a PWSRA is presented in Figure 11.2, with full details presented in **Technical Appendix 11.2**.

11.71 The properties not taken forward into the PWSRA were deemed either distant enough, or outside of the Site drainage pathways so as not to be hydrologically connected to the Proposed Wind Farm Development, or located such that the likely zone of contribution (ZoC) of the PWS would not be at risk from any potential wind farm activity. The ZoC is defined as the area up hydraulic gradient of the PWS, based upon the geology and topographic information of the Site.

11.72 The 28 properties requiring a PWSRA are presented in Table 11.7. Eleven different private water supplies were identified through consultation with the property residents and full details are presented in **Technical Appendix 11.2**.

Table 11.7 : Properties considered within the PWSRA

Property	Property NGR	Use of PWS confirmed by Site Visit
1-6 Forestry Houses	NH964457	No – mains supply
Achnabechan Farm	NH959437	Yes
Airdrie Farm	NH979469	Yes
Airdrie Mill	NH976459	Unknown – No response
Aitnoch	NH981397	Yes
Boathouse at Loch Kirkcaldy	NH964416	No water supply
Boathouse at Lochan Tutach	NH986402	No water supply
Braemoray Lodge	NH998428	Yes
Culfearn	NJ000438	Yes
Factors House	NH958445	No – mains supply
Ferness village	NH963450	No – mains supply
Ferness – Old Post Office	NH964451	No – mains supply
Glenferness Village hall	NH964451	No – mains supply
Head Forester's House	NH964454	No – mains supply
Kerrow Farm	NJ996419	Yes
Little Aitnoch	NH969408	Yes
Little Lyne	NH974453	Yes
Logie Farm & Riding Centre	NH969466	Yes
Muckle Lyne	NH979453	Yes
Score Farmhouse & Farm	NH973459	Yes
The Mount	NH979458	Yes
The White House	NJ001433	Spring (Grant's Well)
Tombain (source 1)	Source-NJ002435	Spring (Grant's Well)
Tombain (source 2)	Source-NJ006443	Spring
Tomdow	NJ005447	Yes
Tomnarroch Farm	NH962445	No – mains supply
Unknown nr Achnabechan	NH958437	No – derelict building
Unknown nr Aitnoch	NH986396	Property does not exist

Controlled Activities Regulations Licences

11.73 CAR authorisations are protected from derogation by other users. SEPA has confirmed that there are no CAR Licences located within the Site; however there are three licences located in close proximity to the Proposed Wind Farm Development:

- An abstraction of 500 m³/day (01 April to 31 October only) from Tomnarroch Burn for Achnabechan Farm (CAR/R/1009562) for irrigation purposes is located in sub-catchment B at NH964436. This licence is located approximately 0.4 km downstream of the Site in sub-catchment B. Situated downstream and in the drainage pathways of the Site, the abstraction water quality has the potential to be impacted by the Proposed Wind Farm Development. As an irrigation abstraction, this will have a medium sensitivity to reduced water quality within the Tomnarroch Burn.
- A licence for the disposal of waste sheep dip is located at NH9734589 and licenced (CAR/S/1023502) to Score Farm. This licence is located approximately 0.9 km downstream of the Site in sub-catchment A. As a discharge, this licence is not at risk from the Proposed Wind Farm Development and will not be considered further.
- Due south west of Score Farm and CAR/S/1023502, is an additional licence (CAR/S/1007710) present in sub-catchment A, 0.8 km downstream of the Site. Unfortunately SEPA could provide no further information for this licence and it is unknown for what activity the licence was granted.

Designated Sites

11.74 The River Findhorn (which receives water from all the sub-catchments), harbours freshwater fish and is a designated waterbody under the Fresh Water Fish Directive (2006/44/EC) for the presence of salmonids [14]. This is considered further within **Chapter 8: Ecology**.

11.75 Moidach More SSSI and SAC lies east of the Site and sub-catchments C, D and E, and is designated for blanket bog and peat vegetation. Moidach More SSSI and SAC is one of the

most important peatland sites in north east Scotland and across Britain [15], but is hydrologically disconnected from the Site and therefore would not be affected by the Proposed Wind Farm Development.

11.76 The Lower Findhorn Woods SSSI and SAC is located to the north of the Site along the banks of the River Findhorn and is presented in **Chapter 8: Ecology** Figure 8.6. The SSSI and SAC area is designated for mixed woodland on base-rich soils as well as lichen assemblages and freshwater habitats. Stripe of Little Lyne and Stripe of Muckle Lyne (sub-catchment A) and Tomnarroch Burn (sub-catchment B) drain directly into the River Findhorn, 4 km upstream of the SSSI and SAC Site. It is unlikely that any potential impacts from the Proposed Wind Farm Development would propagate downstream and be uptaken by the SSSI and SAC, due to the distance upstream of the Site. As such, in terms of a Habitat Regulations Assessment, it is considered that the Proposed Wind Farm Development is not likely to have a significant effect on the integrity of the SAC; nevertheless mitigation during construction and the draft Construction and Decommissioning Method Statement (**Technical Appendix 5.1**) will ensure that all best practice pollution prevention measures are put in place.

11.77 Approximately 7 km downstream of the Site on the west bank of the River Findhorn also lies the Darnaway and Lethen Forest SPA. Designated for its breeding capercaillie, the SPA does not receive any direct drainage from the Site and therefore, does not have the potential to be affected by the Proposed Wind Farm Development.

11.78 The Moray Firth SAC and Culbin Sands, Culbin Forest and Findhorn Bay SSSI will receive drainage from the River Findhorn. However, both the SAC and SSSI are sufficiently downstream of the Site (over 20 km) to be at no risk from the Proposed Wind Farm Development.

Groundwater Dependent Terrestrial Ecosystems

11.79 A number of GWDTE have been identified within the Site by the National Vegetation Classification Survey undertaken in **Chapter 8: Ecology**. The GWDTE are all underlain by peat and either by till or glaciofluvial superficial deposits, which are likely to have a high surface-groundwater connectivity with upslope runoff.

Future Baseline

11.80 The baseline environment is unlikely to change from the current baseline under the "do nothing" scenario in terms of land use. However, climate is likely to prove more variable, with observed historical and predicted future changes in global climate due to a combination of both natural and human causes. Based upon the 11 scenarios considered by the UK Climate Impact Programme (UKCP09), climate change predictions indicate that the River Findhorn at Forres (gauging station 7002) is likely to experience either an increase or decrease of up to 10 % in mean flow. In addition, low flows (Q90) are likely to decrease[16]. Therefore changes in runoff and recharge characteristics may occur on the Site, even without development.

11.81 Due to the unknown variables associated with the future baseline, the assessment of the baseline environment has considered the existing baseline situation and has not included future scenarios.

Baseline Summary and Sensitivities

11.82 Table 11.8 summarises the findings of the existing baseline environment assessment. The sensitivity of the baseline environment is based upon the findings of the catchments draining the Site to the River Findhorn.

Table 11.8: Summary of Baseline Assessment

Sub-catchment	Baseline Description	Sensitivity
A: Stripe of Little Lyne and Stripe of Muckle Lyne	▪ This catchment drains the northern extents of the Site via a number of tributaries and lochans, into the River Findhorn. The River Findhorn is a designated waterbody under the Fresh Water Fish Directive (2006/44/EC) for the presence of salmonids. This catchment is encompassed within the River Findhorn catchment and is defined as having a 'Good' water quality status under the Water Framework Directive. There are four properties on a PWS (as confirmed by THC) and potentially a further property (Airdrie Mill) served by a PWS within this sub-catchment.	High
B: Tomnarroch Burn	▪ This is the largest catchment and drains the western extents of the Site via Tomnarroch Burn to the River Findhorn. This catchment is encompassed within the River Findhorn catchment and is defined as having a 'Good' water quality status under the Water Framework Directive. There is one property served by a PWS within the sub-catchment (Achnabechan Farm).	Medium
C: Burn of Lochantùtach	▪ This catchment drains the south and south eastern extents of the Site to the Dorback Burn via a number of tributaries and Lochan Tùtach. This catchment drains to and is encompassed within the Dorback Burn catchment; thus is defined as having a 'Bad' water quality status under the Water Framework Directive. There is one property served by a PWS within the sub-catchment.	Medium
D: unnamed	▪ This small catchment drains the eastern flank of Cairn Duhie and the Site to the Dorback Burn. This catchment drains to and is encompassed within the Dorback Burn catchment; thus is defined as having a 'Bad' water quality status under the Water Framework Directive. There are no properties served by a PWS within the sub-catchment.	Low
E: unnamed (amalgamation)	▪ This catchment comprises an amalgamation of smaller sub-catchments which drain a tiny proportion of the eastern extent of the Site. This catchment drains to and is encompassed within the Dorback Burn catchment; thus is defined as having a 'Bad' water quality status under the Water Framework Directive. There are no properties served by a PWS within the sub-catchment.	Low

15 Scottish Natural Heritage Gateway SiteLink for Moidach More SSSI and SAC, Culbin Sands, Culbin Forest and Findhorn Bay SSSI, Moray Firth SAC and Darnaway and Lethen Forest SPA (*http://gateway.snh.gov.uk/sitelink/index.jsp*)

16 Centre for Ecology and Hydrology. 2012. Future Flows and Groundwater Levels (*http://www.ceh.ac.uk/sci_programmes/Water/FutureFlowsandGroundWaterLevels.html*)

Table 11.8: Summary of Baseline Assessment		
Sub-catchment	**Baseline Description**	**Sensitivity**
F: unnamed	▪ This small catchment drains the north eastern extent of the Site via an unnamed tributary. This catchment drains to and is encompassed within the Dorback Burn catchment; thus is defined as having a 'Bad' water quality status under the Water Framework Directive. There are no properties served by a PWS within the sub-catchment.	Low

Potential Impacts

11.83 The direct potential significant impacts of the Proposed Wind Farm Development on the baseline environment are on the water quality, water resources, peat hydrology and flood risk of the surface and groundwater in the sub-catchments. These impacts then have indirect impacts upon the water use, GWDTE and aquatic ecology.

11.84 This section describes the direct potential significant impacts to the baseline environment and the subsequent indirect potential impacts on water use (specifically private water supplies) and GWDTE. The impacts upon aquatic ecology are presented in **Chapter 8: Ecology**.

Potential Construction and Decommissioning Impacts

11.85 The infrastructure, as detailed in **Chapter 4: Description of Development** comprises 20 three-bladed turbines, horizontal axis wind turbines, each up to 110 m maximum to tip height. The Proposed Wind Farm Development would include associated electricity transformers, underground cabling, a newly created site entrance, access tracks, turning points, road widening works, crane hardstandings, control building and substation compound, communications mast, and temporary and a long term free-standing wind monitoring (anemometer) mast. Temporary works include a construction compound with car parking, a temporary storage area, crane hardstandings, access track turning heads, welfare facilities and temporary guyed meteorological masts. The site layout includes approximately 10.3 km of new site track. The tracks would have a width of 6 m on straight sections including shoulders on each side, but would be wider on bends. The total permanent land take from the new track would be 0.072 km^2. This includes land take for the site entrance and turning heads. It is considered likely that floating tracks would be required at a small number of locations on the Site due to the presence of discrete areas of deep peat in the vicinity of the access track. It is envisaged that between 190 m and 300 m of track would be floated, with the remainder being of excavated construction. The infrastructure and land take is presented in Figure 4.1 of Chapter 4.

11.86 The design of the Site layout has avoided crossing any natural watercourses. The access track and junction between Turbines 5, 4 and 1 would however cross a number of artificial land drains and historical peat cuttings, as can be seen on Figure 11.6.

11.87 Following construction, cable trenches and the temporary construction compound would be reinstated. After its operational life, the Proposed Wind Farm Development would be decommissioned as detailed in **Chapter 5: Construction and Decommissioning**. During decommissioning, the majority of the infrastructure would be removed and/or reinstated. Underground cables and deep turbine foundations would remain in place. Site tracks may also be left in situ.

11.88 During construction of the infrastructure and to a lesser extent decommissioning, the primary impacts are the temporary potential for reductions in water quality through sedimentation and changes to in-stream hydrochemistry. These arise from the necessary ground disturbance resulting in an increased sediment supply and the potential mobilisation of this sediment, resulting in wash off into the stream network and subsequent increased in-stream concentrations. Disturbance of peat may result in peat instability and acidification of draining waterbodies. Finally the potential temporary impacts also include the potential for the pollution of watercourses as a consequence of accidental spillage of chemicals, hydrocarbons and other construction materials. These are discussed in the following sections, followed by the indirect potential impacts upon the private water supplies and GWDTE.

Reduced Water Quality

11.89 Necessary ground disturbance would occur throughout the construction period. During this period the covering vegetation would be disturbed within construction zones, therefore exposing the underlying soils and greatly enhancing the erosion potential. Temporarily exposed soil offers a readily mobilised source of sediment, in addition to temporary stockpiles generated during excavation of foundations, access tracks and cable trenches. The consequences of ground disturbance have to be considered both in the context of areas where the ground would be disturbed and how stockpiled soils would be managed.

11.90 During excavation works, it may be necessary to control groundwater levels to ensure the excavations do not fill with water, either by the use of cut-off drains or dewatering (removing free water). Any direct or pumped runoff from the excavation works is likely to contain very high sediment concentrations. The peat erosion potential of any peat disturbed may also be enhanced as a consequence of localised drying of the peat and resultant oxidation. Although, as a consequence of the climatic regime it is not anticipated that there would be significant drying of the peat in the vicinity of the excavations.

11.91 Runoff from the site construction zones in practice would generally not pass directly to a main watercourse but drain to the surrounding land. Runoff draining to the surrounding land would aid attenuation of runoff rates and sediment filtration within the vegetation across the surface. However, the risk of sediment pollution increases when construction activities occur in close proximity to the watercourses and within the vicinity of artificial drains across the Site. Artificial drains may offer a quick routing of potentially sediment laden runoff directly into watercourses.

11.92 Catchments draining peat tend to be acidic with the acidity of the stream correlating with runoff. In addition to high sediment loads from any disturbed peat, the acidity within the

runoff from these disturbed areas, under high flow conditions, would be greater than that from undisturbed areas. If construction disturbs underlying superficial geology which may contain metal salts, the acidic runoff can leach these salts resulting in high concentrations of metals in the runoff. Of particular concern is Aluminium which, under acidic conditions is toxic to sensitive freshwater organisms.

11.93 As part of the Proposed Wind Farm Development, there is a requirement to fell an estimated 0.01 ha of broadleaved woodland, an estimated 0.94 ha of scattered broadleaved trees and 0.92 ha of coniferous plantation (scattered Scots Pine), during construction. Additional felling is also required to meet turbine manufacturer warranties and this comprises 3.46 ha of broadleaved woodland, an estimated 2.20 ha of scattered broadleaved trees and an estimated 1.56 ha of scattered coniferous trees, all to be replanted in situ. Therefore, the total maximum area to be felled has been entered as 9.09 ha. Trees would be replanted during the construction phase to screen the substation and access track junction with the A939. A description of the felling and replanting proposals is provided in **Chapter 4: Development Description.** The potential significant impact upon water quality during forestry operations is via sediment pollution and hydrochemical changes. Scientific research, adopted within the Forest and Water Guidelines [17], has shown that the proportion of a catchment felled within one year has an impact on the magnitude of the hydrochemical response. It has been demonstrated that there is no discernible hydrochemical response outside the natural variability, if the proportion of the total catchment area that is felled, is less than 20 %. Subsequently, as the proportion to be felled is very small and equals less than 1.0 % of the sub-catchments area, felling will not be considered further.

11.94 Finally, there would also be the potential for pollution from the accidental spillage/loss of chemicals and materials such as cement, fuel, oils and lubricants during the construction period. Polluting materials could enter and contaminate surface watercourses or superficial groundwater from these sources as a result of accidental spillage, leakage of stored materials, incorrect use of toxic substances and runoff during storm events.

Peat Stability

11.95 As wind farms tend to be constructed in high moorland areas, which are commonly associated with significant peat deposits (typically blanket bogs), there is a risk of peat instability. A peat stability risk assessment was conducted by Mott MacDonald Ltd to assess the risk of slope instability associated with the construction of the Proposed Wind Farm Development, as detailed in **Technical Appendix 5.4**. Peat instability is a natural occurrence which is influenced by many factors including, but not limited to, peat thickness, hill slope gradient and subsurface hydrology.

11.96 The risk of peat instability increases where peat deposits are in excess of 1 m deep. The Phase 1 peat depth survey (conducted by MacArthur Green Ltd) revealed that, for the majority of the survey area (74 %), probes recorded a peat depth of less than 1 m. As detailed in **Technical Appendix 5.3**, a more detailed Phase 2 Peat Probing & Peat Coring Study was conducted at 50 m intervals along centre lines of tracks and roads and 10 m intervals at turbine locations, substation, construction compounds, meteorological masts and storage area. The Phase 2 survey revealed the majority of the infrastructure design is located in peat depths of less than 1.5 m, with a small area of infrastructure sited on peat depths of up to 2.5 m. However, it is not considered necessary to undertake a full quantitative risk assessment for the Site, given that locations with significant peat deposits (i.e. >0.5 m thick) are localised to areas of low sloping terrain. The Peat Stability Risk Assessment (**Technical Appendix 5.4**) found that the risk of peat slide events occurring is classified as Very Low to Low and thus will not be considered further.

Private Water Supplies

11.97 The water use within the catchments draining the Site consists of a number of abstractions of private water supplies, with full details presented in **Technical Appendix 11.2**. The potential impact upon the private water supplies would be as a result of direct impacts upon the groundwater resources and groundwater quality. As drinking water, these abstractions are highly sensitive to reductions in water quality.

11.98 The water supplies potentially at risk from the Proposed Wind Farm Development are those with zones of contribution extending into, or within 250 m of the Site or within areas draining the Site; specifically The Muckle Lyne Supply and Little Lyne Combined Back-up Supply (refer to Figure 11.4). There is no potential impact upon the other PWS in the vicinity of the Site identified in **Technical Appendix 11.2**.

11.99 The Muckle Lyne Supply services the house and outbuildings. The supply consists of a well situated on the banks of the Stripe of Muckle Lyne downstream of the Site's northern boundary. It is thought the majority of the supply directly abstracts from the Stripe of Muckle Lyne (which flows through the Site), in addition to groundwater contributions. Little information is known about the depth of the well. Superficial till and glaciofluvial deposits of gravel, sand and silt underlay the well's location and border the Stripe of Muckle Lyne. A 250 m exclusion zone has been applied at the location of the source, as displayed in Figure 11.4. The well is located 1.3 km at its closest point from any infrastructure (Turbine 20). Due to the well's location adjacent to the Stripe of Muckle Lyne, the water supply is hydrologically connected to the Site and the Stripe of Muckle Lyne will receive drainage from Turbines 20, 18, 16, 15, 14 and 13. Without appropriate mitigation, the water supply may be at risk from a reduction in water supply, hydrochemical changes or accidental spillage/loss of chemicals and materials during the construction and operation of the Proposed Wind Farm Development.

11.100 The Little Lyne Combined Back-up Supply services Little Lyne house and farm and The Score house and farm. This supply has not been used in about 10 years and is a back-up supply to The Score Combined Supply. The supply consists of a spring fed pump house which drains a tributary of the Stripe of Little Lyne. The spring is thought to abstract from emerging superficial groundwater situated within a deposit of glaciofluvial gravel and sand and river terrace gravels, sand, silt and clay. A 250 m exclusion zone has been applied at the location of the spring, as displayed in Figure 11.4. Although the ZoC intercepts the Site boundary,

17 Forestry Commission, 2003. Forest and Water Guidelines. Fourth Edition. Forestry Commission.

there is no infrastructure located within the ZoC and the abstraction is located at least 1.2 km at its closest point to any infrastructure (Turbine 20). Therefore, the supply is not considered to be at risk from any reduction in water supply, hydrochemical changes or accidental spillage/loss of chemicals and materials during the construction and operation of the Proposed Wind Farm Development.

Groundwater Dependent Terrestrial Ecosystems

11.101 Excavation of soil and bedrock during construction within the vicinity of a GWDTE may cause localised disruption and interruption to groundwater flow, with associated dewatering potentially causing a high change to the quantity of groundwater supply. Where GWDTE are present, interrupting groundwater flow may reduce the proportion of the ZoC available to such ecosystems, by changing the quantity of surface water runoff supplying the GWDTE. Contamination of groundwater or surface water may cause physical or chemical contamination to the GWDTE.

11.102 **Chapter 8: Ecology** Figure 8.2a and Figure 8.2b presents all the habitats identified during the ecology National Vegetation Classification (NVC) survey. As part of the NVC survey, a number of habitats were identified as being a GWDTE and these are presented on Figure 11.3. The GWDTE presented in Figure 11.3 are differentiated between those which are highly and moderately groundwater dependant. There are five ecosystems highly dependent on groundwater and four moderately dependent.

11.103 SEPA guidance [18] states that any turbines within 250 m of GWDTE, and any tracks or trenches proposed within 100 m of GWDTE communities must be identified. Four highly dependent and one moderately dependent ecosystem(s) are located down hydraulic gradient of the infrastructure and potentially at risk from a change in groundwater quantity and quality. A ZoC is defined for each habitat as the area up hydraulic gradient of the GWDTE, based upon the geology and topographic information of the Site. The 100 m and 250 m buffers within the ZoC for GWDTE are shown in Figure 11.3. The proportion of contributing surface water runoff to the GWDTE that may be reduced as a consequence of construction, has been conservatively calculated as the total area up hydraulic gradient of the turbines and associated access tracks.

11.104 The analysis in Table 11.9 presents each of the identified highly and moderately dependent ecosystems, and their position relative to the infrastructure. There would be no infrastructure located within a GWDTE. There is also no infrastructure proposed within 250 m of H2, H5, M3 and M4, therefore these GWDTE are not considered further.

11.105 Encroachment into the buffer zones has been minimised. However, H1, H3, H4, M1 and M2 are located within 250 m of a turbine, with M2 also within 100 m of the access track. The potential reduction in ZoC has therefore been estimated for these GWDTE in Table 11.9, in accordance with the guidance. The maximum potential reduction in the ZoC to an individual highly dependent and moderately dependent ecosystem would be 6.5 % and 22.9 % respectively.

11.106 These habitats are likely to be supported by the high rainfall across the Site, therefore appropriate drainage would be required to ensure runoff is not diverted away from the identified GWDTE. Mitigation would also be required to ensure runoff of reduced water quality does not reach these habitats.

Table 11.9 GWDTE Downslope of Infrastructure

GWDTE ID	GWDTE NVC community	Location relative to infrastructure	Groundwater Dependency	GWDTE ZoC (km²)	Potential Reduction in GWDTE ZoC
H1	M6, M6a/b	200 m down gradient of T19, thus T19 is within the ZoC. Within 250 m of T14, but H1 is not down gradient of T14, thus T14 is outside of the ZoC.	High	0.6	6.5 %
H2	M6b/M6c	No infrastructure within 250 m	High	0.8	n/a
H3	M6/M23	108 m from T18. H3 is not down gradient of T18, thus T18 is outside of the ZoC.	High	0.1	n/a
H4	M6, M23, M6a	230 m down gradient of T16, thus T16 is within the ZoC.	High	2.4	1.7 %
H5	M6/M4	No infrastructure within 250 m	High	0.2	n/a
M1	W4, M15/M10/M25, M15/M17/M2	75 m down gradient of T14, thus T14 is within the ZoC.	Medium	0.9	13.4 %
M2	W4/U5	83 m down gradient of T3 and access track, thus T3 and the access track are within the ZoC.	Medium	0.1	22.9 %
M3	M20	No infrastructure within 250 m	Medium	0.1	n/a
M4	M19/M15/M3	No infrastructure within 250 m	Medium	0.4	n/a

Designated Sites

11.107 The River Findhorn receives water from all the sub-catchments, harbours freshwater fish and is a designated waterbody under the Fresh Water Fish Directive (2006/44/EC) for the presence of salmonids [14]. Any potential detrimental impacts upon the water quality have the potential to propagate downstream to the River Findhorn.

18 SEPA (2010). Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments

Potential Operational Impacts

11.108 The operation of the Proposed Wind Farm Development would have potential impacts upon the watercourses through the accidental spillage of chemicals. The long term impacts of the infrastructure include increased impermeable areas changing the existing runoff and drainage, and inappropriately designed infrastructure leading to sediment generation from concentrated runoff points.

Reduced Water Quality

11.109 Incorrectly designed access tracks and cable trenches may offer preferential routing paths through the catchments, leading to scour of track surfaces and erosion of the cable trenches; hence causing an increase in sediment generation. If track drainage is not designed properly, gullying of the soils in the vicinity of tracks may occur. Subsequently, sediment and water of reduced water quality may be routed to the stream network draining the Site.

11.110 Whilst the tracks have been designed to avoid any crossings of watercourses, a number of artificial land drains would be crossed by the junction and access tracks between Turbines 5, 4 and 1. If not designed properly, the land drain crossings may offer preferential routing of drainage and associated sediment wash-off into the drains, resulting in an increase in sediment generation and change to the catchment water quality.

11.111 The use of inappropriate concrete in the infrastructure foundations has the potential to cause long term localised water quality issues. Finally, the accidental spillage/loss of lubricants and other chemicals during Site operation has the potential to adversely affect the water quality, should there be a direct pathway to a watercourse.

Modifications to the Catchment and In-stream Hydrology

11.112 Without appropriate drainage, tracks may reduce cross track flow. Reduced cross track flow can potentially lead to waterlogged areas occurring upslope and the drying of the areas downslope of the track. Where floating tracks are required, the weight of the floating tracks can compact any underlying localised peat, resulting in reduced hydraulic conductivity (and potential collapse of any macropores present). The weight of the floating tracks may also lead to displacement of any peat, raising areas above the water table. Drying of the peat downslope or in displaced areas could result in oxidation and enhanced erosion of the peat.

11.113 As stated in the Baseline Conditions section, the entire Site infrastructure would be located outside the Indicative River & Coastal Flood Map (Scotland) 1 in 200 year flood zone. However, as the on-site watercourses have a catchment area less than 3 km², the 1 in 200 year flood zone has not been defined in these areas. Outwith the Site, an increase in the risk of flooding to the Burn of Fevene and its neighbouring properties from the Proposed Wind Farm Development would only arise if there is an increase in impermeable surfaces across the Site; and this has been be addressed within the SuDS Design Statement (see **Technical Appendix 11.3**).

11.114 The infrastructure of the Proposed Wind Farm Development would require long term land take, which consists of the control room and sub-station, wind turbine towers and external transformers, permanent crane hardstandings, permanent masts and access tracks. These account collectively for approximately 1.58 % of the total area within the Site. Temporary land take comprises a construction compound with car parking, a temporary storage area, crane hardstandings, access track turning heads, welfare facilities and temporary guyed meteorological masts. The imperviousness of these areas would limit infiltration, which may result in small increases in runoff rates and peak flood flows across the Site. However, in practice, runoff from any such impervious and semi-permeable areas would not pass directly to a main watercourse but would drain to the surrounding land, where runoff rates would be attenuated.

11.115 The extent of long-term and temporary land take areas is presented in **Chapter 4: Description of Development**. The long term land take consists of a combination of impervious foundations and semi-permeable tracks and other hardstandings, with the exception of the turbine foundations which would remain in situ after the wind farm is decommissioned. The impervious foundations would limit infiltration, but partial infiltration would occur within the semi-impermeable surfaces. The worst case scenario land-take areas would consist of approximately 0.1 km² (10.52 ha) for the life of the project (see **Chapter 4: Description of Development** for further details). An estimated temporary land-take consists of 0.02 km² (2.10 ha) to be directly disturbed during construction, which would be restored following the construction period.

11.116 The land take areas are small relative to the total Site area but must be considered in the context of the extent of these features within the sub-catchments draining the Site. The current urban extent defined within the Flood Estimation Handbook (FEH) catchment descriptors (URBEXT2000) prior to the Proposed Wind Farm Development is zero within all the sub-catchments. The total fractional extent of new surfaces introduced would be less than 1 % of the sub-catchment areas. As the FEH methods [12,19] do not consider the flood response of a catchment to be significantly modified unless the urban extent exceeds 3 %, the sub-catchments would be considered to have a natural response to rainfall, post construction. This method is very conservative as it accounts for all new land take (all permanent and temporary impermeable and semi-permeable surfaces), whereas only impermeable surfaces would be accounted for within the FEH methods. It is therefore reasonable to assume that the overall flood response of the catchments would not be affected by the presence of this infrastructure.

11.117 Given the small fractional extent of impermeable and semi-permeable surfaces introduced within the Site and the fact that any runoff would re-infiltrate locally across the Site, it is reasonable to assume that the presence of the infrastructure would have no impact on the low flows or water resources within the catchment.

Private Water Supplies

11.118 During the operation of the Proposed Wind Farm Development, the potential impact upon the Muckle Lyne Supply would be as a result of direct impacts on the water quality through

19 Bayliss, A.C., Black, K.B., Fava-Verde, A. and Kjeldsen, T.R. (2006) URBEXT2000 - A new FEH catchment descriptor Calculation, dissemination and application. Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme. R&D Technical Report FD1919/TR

enhanced erosion, hydrochemical changes and accidental spillage/loss during operational maintenance. There are no potential operational impacts upon the remaining PWS identified in **Technical Appendix 11.2**.

Groundwater Dependent Terrestrial Ecosystems

11.119 A detailed analysis of the potential impacts on GWDTE is presented within the Potential Construction and Decommissioning Impacts section. During the operation of the Proposed Wind Farm Development, the presence of the infrastructure may cause localised disruption to groundwater flows. The potential reduction in the ZoC to the ecosystems is presented within Table 11.9.

11.120 Appropriate cross drainage would be required to ensure runoff and subsurface flows draining to the identified GWDTE is maintained.

Designated Sites

11.121 As for the Potential Construction and Decommissioning impacts, any potential detrimental impacts during the operational phase upon water quality have the potential to propagate downstream to the River Findhorn, designated for the presence of salmonids.

Mitigation

11.122 The reduction of impacts by design is presented first, but further mitigation would be required to offset any potential significant impacts. Mitigation measures during construction and operation of the proposed wind farm are therefore presented and these are included within the draft Construction and Decommissioning Method Statement (CDMS) (refer to **Technical Appendix 5.1**).

Mitigation by Design

11.123 The reduction of impacts is an inherent part of the design of the layout of the infrastructure. This section presents the layout design constraints, along with mitigation of the Site drainage to be incorporated into the CDMS.

Layout Design Constraints

11.124 As discussed in **Chapter 3: Design Evolution and Alternatives**, the design of the Proposed Wind Farm Development has evolved through a number of iterations, taking account of environmental designations and constraints. The information collated within the baseline assessment studies and site visit was used to identify hydrologically sensitive areas of the Site and hence develop a map of constraints on the Proposed Wind Farm Development's infrastructure locations. The hydrological features and constraints map is presented in Figure 11.4.

11.125 These constraints include an exclusion zone in the vicinity of the surface water features (e.g. river, loch or wetland) mapped on OS 1:10,000 scale, which in accordance with PPG5 [20], has conservatively been defined as 50 m. These exclusion zones are shown on Figure 11.4 which ensure all infrastructure would be located at least 50 m from surface water features. Turbine centres are positioned at least a 70 m from surface water features to account for the turbine foundation diameter.

11.126 The private water supplies and GWDTE located within 100 m of roads, tracks and trenches and 250 m from foundations have been identified in the wind farm design process, in accordance with SEPA Guidance [21]. Of the PWS, a 250 m exclusion zone extending within the Site has been applied to the supplies serving Muckle Lyne and Little Lyne. With exception of the Score Combined Supply, no other abstractions are located within 250 m of the Site.

11.127 For the GWDTE 100 m buffers within the ZoC for tracks and trenches, and 250 m buffers for turbines was used within the layout design to minimise any encroachment into these buffer zones (presented on Figure 11.3). H1, H3, H4, M1 and M2 are located within 250 m of a turbine and/or 100 m of an access track and require further mitigation through site drainage design, runoff and sediment control measures and pollution prevention.

11.128 The Proposed Wind Farm Development has been designed such that development should be avoided within the exclusion zones. Any development within these areas would require additional location specific mitigation. In addition, the layout constraints would be followed during any micro-siting of infrastructure.

11.129 The design of access tracks should be limited where possible, to a maximum track gradient of 8-10 % with the potential for short lengths (less than 200 m) up to 12.5 %[22]. Figure 11.4 highlights where the topographic gradient (based upon a 5 m Digital Terrain Map) exceeds 8 % and 12.5 %, the orientation of the tracks should be constrained to keep track gradients below 8 %. As the majority of the Site is at a gradient less than 8 %, there are few constraints upon the orientation of the new access tracks.

Site Drainage Design

11.130 Correct design of the Site drainage is an important element in maintaining the long term continued stability of any peat, minimising erosion, maintaining the supply to GWDTE and the potential for pollution of the watercourses draining the Site. The potential impact of preferential routing of drainage and associated erosion and sediment wash-off within the sub-catchments draining the Site, would be mitigated through the following measures which are incorporated into the draft CDMS and SuDS design (see **Technical Appendices 5.1 and 11.3**):

- Use of floating track design where the access tracks cross peat greater than 1.5 m depth to limit disturbance of peat and localised subsurface flow paths. Construction of the floating tracks shall allow for continued drainage across the track, either through constructing the sub-base with coarse granular material, or by constructing sub-surface drains through the peat at regular points along the length of the track.
- Access track construction materials shall be free draining, strong, durable and well graded.

20 Pollution Prevention Guidelines 5 (2007). Works and maintenance in or near water

21 SEPA (2010). Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments

22 Scottish Natural Heritage (2013). Constructed tracks in the Scottish Uplands

- Settlement/attenuation ponds and silt fences shall be provided adjacent to the track drains to avoid pollution and sedimentation of watercourses.
- Avoidance of directing track drainage into existing watercourses (via swales and under road cross drains, with detailed design presented in **Technical Appendix 11.3**) shall ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses.
- The historical land drains located across the Site shall be piped directly under the access track through appropriately sized drainage pipes or culverts. Appropriate scour prevention and energy dissipation structures shall be constructed at each culvert outlet. Where appropriate a shallow, lateral drainage swale shall be installed at the toe of access track cuttings to intercept the natural runoff. This lateral drain shall be piped under the track at regular intervals through correctly sized cross drains away from watercourses. Again appropriate scour prevention and energy dissipation structures shall be constructed at each culvert outlet.
- Flow and sediment transport in any track drainage swales shall be minimised by reducing concentrated flows, installing regular cross culverts and the use of checkdams placed at regular intervals within the roadside drainage swales.
- Where required, track drainage swales shall discharge into sediment/attenuation ponds excavated on the downslope side or silt fences. A shallow drainage swale shall be cut directly downhill as a fan and at minimum slope, until the bottom of the swale reaches the natural surface level. The discharge point of track drains shall be constructed to minimise concentrated flows and ensure flows are dispersed over a large area with appropriate surface protection.
- The depth of individual drainage swales shall be kept to the minimum necessary to allow free drainage of the tracks. Swale lengths shall be minimised to avoid disruption of natural drainage paths. Direct drainage into existing watercourses shall also be avoided to ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses.
- Impermeable (e.g. clay) plugs shall be inserted within cable trenches at a frequency agreed with the Ecological Clerk of Works to suit the specific location to prevent gullying of trenches and preferential routing.

Mitigation during Construction

Runoff and Sediment Control Measures

11.131 The following measures would be used to mitigate any potential impacts on the water quality of the sub-catchments through erosion during construction. These are incorporated into the draft CDMS and SuDS design, as detailed in **Technical Appendices 5.1 and 11.3**.

- Sediment control measures (silt fences, settlement/attenuation ponds etc.) shall be used in the vicinity of watercourses, springs or drains where natural features (e.g. hollows) do not provide adequate protection.
- Sediment control measures (e.g. check dams, silt fences etc.) shall be employed within the existing artificial drainage network during construction. These would be regularly checked and maintained during construction and for an appropriate period following completion. The Outline Habitat Management Plan (**Technical Appendix 8.7**) prescribes the damming of active drains to sufficiently raise water levels to create suitable conditions for *Sphagnum* species.
- Watercourses shall be monitored throughout the construction period by the Ecological Clerk of Works to identify any enhanced scouring of the catchment surface. If sediment from disturbed ground is excessively mobilised through the minor channels network, this shall be mitigated by temporary sediment control measures (e.g. geotextiles/straw bales/brash).
- The extent of all excavations would be minimised as far as is practicable. During construction activities, surface water flows shall be captured through a series of cut-off drains to prevent water entering excavations or eroding exposed surfaces. If dewatering of excavations is required, pumped discharges shall be passed through, settlement/attenuation ponds and silt fences to capture sediments before release to the surrounding land away from watercourses. Measures shall be taken to ensure water flowing away from dewatering areas does not re-enter excavations.
- Permanent relocation of soils shall be re-instated with vegetation as soon as practicable.
- Where practicable, vegetation over the width of the cable trenches shall be lifted as turfs, and replaced after trenching operations, to reduce disturbance.
- The movement of construction traffic shall be controlled to minimise soil compaction and disturbance. Vehicle movements (to include HGVs and plant machinery) outside the defined tracks and hardstanding areas shall be avoided where possible.
- Temporary peat stockpiles shall be stored on a geotextile membrane and covered. Stored soils shall be placed so as to minimise the potential for erosion distributed in flat areas away from watercourses. These measures are incorporated within the draft CDMS.
- Trenching or excavation activities in open land shall cease during periods of intense rainfall and temporary bunding shall be provided as required, to reduce the risk of sediment transport to the natural drainage system.
- Construction of the existing land drain track and cable crossings shall take place during low flow conditions where reasonably practical. If required, the drain shall be dammed and water shall be overpumped to isolate the construction zone. The construction period would be minimised as much as is reasonably practicable.

11.132 All felling would be conducted in accordance with the Forest and Water Guidelines[23].

Flood Mitigation

11.133 Temporary land take areas (construction compound with car parking, temporary storage area, temporary elements of crane hardstandings, welfare facilities etc.) shall be fully reinstated following the construction period to reduce areas of semi-impermeable surfaces.

23 Forestry Commission, 2011. Forest and Water Guidelines. Fifth Edition. Forestry Commission.

Temporary land take areas shall be cleared of hardcore, re-graded with soil to a natural profile and re-vegetated.

11.134 The Site has been assessed for flood risk in line with Scottish Planning Policy, and a full flood risk assessment is not considered to be required for the Site, as detailed in within Paragraph 11.57 and 11.58. A sustainable approach to the drainage (SuDS) of the Site has been assessed ensuring that off-site water quality is not compromised. Runoff and sediment control measures (as described in the previous section) would be implemented and the SuDS Design Statement will describe the design standards and drainage philosophy to be adopted. The SuDS Design Statement is presented in **Technical Appendix 11.3**.

Construction Pollution Prevention, Water Quality Monitoring and Emergency Response Plan

11.135 The potential impact on the water quality of the sub-catchments draining the Site through chemical pollution, would be mitigated through the implementation of the draft CDMS. The draft CDMS includes sections dealing with pollution prevention measures, water quality monitoring and procedures in the event of a spill. Contractors and sub-contractors shall be required to follow Pollution Prevention Guidance published by SEPA. The following pollution control measures are explicitly incorporated into the draft CDMS and deployed within all sub-catchments:

- Equipment shall be provided to contain and clean up any spills in order to minimise the risk of pollutants entering watercourses, lakes, GWDTE or flush areas.
- Trenching or excavation activities in open land shall cease during periods of intense rainfall. Temporary bunding shall be provided as required, to reduce the risk of oil or chemical spills to the natural drainage system.
- Sulphate-resistant concrete (as detailed in the Code of Practice for Concrete Design BS 5328) shall be used for the construction of turbine bases to withstand sulphate attack and the resultant alkaline leaching into groundwater.
- Refuelling of vehicles and plant machinery shall be confined to the designated fuelling areas and shall be carefully controlled.
- Vehicles, plant machinery and equipment would be cleaned at designated washout areas located conveniently and within a controlled area of the Site.
- Equipment, materials and chemicals shall not be stored within 50 m of watercourses. At storage sites, fuels, lubricants and chemicals shall be contained within an area bunded to 110 %. All filling points shall be within the bund or have secondary containment. Associated pipework shall be located above ground and protected from accidental damage.
- Concrete shall be brought onto the Site ready mixed and any onsite washout shall occur in designated concrete washout areas, which would be lined to prevent infiltration of high alkaline content flow and would be covered to minimise the ingress of rainwater to the containment areas.
- Drip trays shall be placed under standing machinery.
- All solid and liquid waste materials shall be properly disposed of in controlled landfill sites away from the Site.
- Routine mechanical maintenance of vehicles shall be carried out off-site or in a suitable designated area of the site.
- There shall be no unapproved discharge of foul or contaminated drainage from the Site either to groundwater or any surface waters, whether direct or via soakaway.
- Sanitary facilities shall be provided and methods of disposal of all waste shall be approved by SEPA.
- A programme of surface water quality monitoring would be undertaken before and during the construction phase to provide assurance as to the absence of water quality impacts.

Protection of Water Supplies

11.136 For the prevention of doubt, no refuelling or storage of equipment, materials or chemicals shall occur within the zones of contribution as shown on Figure 11.4. Equipment to contain and clean up any spills shall be readily available at all times in this area.

Protection of Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

11.137 As detailed in Table 11.9, the ecosystems of H1, H3, H4, M1 and M2 are located within 250 m of a turbine. M2 is also located within 100 m of an access track. Therefore, these GWDTE require the following additional measures to mitigate any potential impacts on these sensitive ecosystems:

- Identify flush areas and natural depressions.
- Provide pipes and/or drainage matting to ensure hydraulic conductivity is maintained across the GWDTE.
- Provide silt fences and ensure suitable measures are in place to avoid pollution of the GWDTE by sediment laden runoff.
- Avoid diverting flows away from the GWDTEs by drainage channels.

11.138 Specific consideration within the drainage design (see **Technical Appendix 11.3**) would additionally ensure hydrological connectivity between the site and GWDTE is not interrupted or modified during the construction and operation of the Proposed Wind Farm Development.

Mitigation during Operation

Operational Pollution Prevention, Water Quality Monitoring and Emergency Response Plan

11.139 An operational pollution prevention, water quality monitoring and emergency response plan would be established to address the potential significant long term impact of sediment and chemical pollution. The plan would include provision for the following:

- Equipment to be provided to contain and clean up any spills of fuel or lubricants and to address burst oil cooling of power cables as required.
- Regular inspection of the track and turbine bases to ensure no unacceptable erosion is

taking place, with appropriate practicable remedial action taken, should erosion be noted.

- Regular inspection of the land drain crossings to ensure no erosion is taking place, with appropriate practicable remedial action taken, should erosion be noted. The crossing would also be kept clear of debris.
- If required, floating access tracks on peat may settle with time and therefore on-going repair and maintenance would be required.
- Vehicles, plant machinery and equipment would be cleaned at designated washout areas located conveniently and within a controlled area of the Site.
- Equipment, materials and chemicals shall not be stored within or near watercourses. At storage sites, fuels, lubricants and chemicals shall be contained within an area bunded to 110 %. All filling points shall be within the bund or have secondary containment. Associated pipework shall be located above ground and protected from accidental damage.
- Drip trays would be placed under standing machinery.
- Routine monitoring of surface water quality would be undertaken to demonstrate the absence of any ongoing impact arising from the operation of the Proposed Wind Farm Development.

Assessment of Residual Impacts

11.140 This section discusses the direct residual impacts of the Proposed Wind Farm Development on water quality, water resources, peat hydrology and flood risk of the sub-catchments and groundwater, along with the indirect residual impacts to the private water supplies and GWDTE. The residual impacts on aquatic ecology are presented within **Chapter 8: Ecology**.

11.141 The entire Site infrastructure is located within sub-catchments A to D, with the access route site entrance located in sub-catchment B. These sub-catchments have a range of sensitivity ratings (High, Medium and Low), thus the residual impacts are presented for the most sensitive sub-catchments.

Residual Construction Impacts

Water Quality

11.142 The potential impact on water quality during construction would be through runoff from disturbed ground, spoil heaps and excavations potentially containing high sediment loads. As the risk of sediment pollution increases when construction activities occur in close proximity to the watercourses, the design mitigation ensures that construction activities would not occur within these areas. These potential impacts have been reduced through the runoff and sediment control measures. Additional sediment control measures would be employed to ensure that the existing land drains do not offer quick routing of runoff from construction areas directly into watercourses.

11.143 The potential impact of pollution from the accidental spillage/loss of cement, fuels, oils, lubricants and other chemicals during the construction period would be managed through the measures set out in the construction pollution, prevention, water quality monitoring and emergency response plan.

11.144 It is considered that these residual impacts would have a small magnitude of change to the surface water quality as these cannot be completely mitigated. The significance of the residual impact would therefore be *minor*, which is considered not significant.

Private Water Supplies

11.145 Following incorporation of the site wide mitigation measures and the 250 m private water supply exclusion zone, the magnitude of change is considered to be small to the private water supplies. Operational and long term impacts of the Proposed Wind Farm Development on the private water supplies would be small. It is therefore considered that the residual impact upon the drinking water supplies would be **minor**, which is not significant.

Groundwater Dependent Terrestrial Ecosystems

11.146 There would be no infrastructure located within a GWDTE, therefore there would be no direct loss of a GWDTE. In addition, there would be no infrastructure within 250 m of H2, H5, M3 and M4, therefore there would be no impact upon these GWDTE.

11.147 Where excavations occur in close proximity up hydraulic gradient of the GWDTE, there is potential to reduce the ZoC supplying the ecosystem during construction. In accordance with the SEPA Guidance, the design mitigation for the infrastructure layout has significantly minimised the turbine foundation excavation within 250 m of highly or moderately dependent habitats and any tracks or trenches proposed within 100 m (up gradient) of the GWDTE. However, H1, H3, H4, M1 and M2 are located within 250 m of a turbine, with M2 also within 100 m of the access track. For the highly dependent the closest turbine within the ZoC is 200 m up gradient of H1. For the moderately dependent the closest turbine is 75 m from M1.

11.148 The maximum potential reduction in the ZoCs is 6.5 % for those habitats considered to be highly dependent and 22.9 % for moderately dependent habitats. These potential reductions have been significantly decreased through specific additional mitigation measures and consideration within the drainage design (see **Technical Appendix 11.3**) to ensure that the ZoC is not reduced. Additional pollution prevention and runoff/sediment control measures have reduced the potential impact of reduced water quality, such that the construction is considered to have a small magnitude of change to the GWDTE. Thus the significance of the residual impact would be **minor**, which is not significant.

Residual Operational Impacts

Water Quality

11.149 The potential impact on water quality as a result of the operation of the Proposed Wind Farm Development would be through the potential pollution from the accidental spillage/loss of cement, fuels, oils, lubricants and other chemicals. Potential impacts would be managed through the operational pollution prevention and emergency response plan; resulting in a

negligible magnitude of change to the surface and groundwater quality.

11.150 The long term potential impact on water quality would be through the erosion of both the Site infrastructure (access tracks and associated drainage, hardstanding surfaces or cable trenches) and surrounding soil and peat. This potential impact has also been mitigated further through the Site drainage design measures. This residual impact would therefore have a negligible magnitude of change to the surface water quality.

11.151 The potential long term localised water quality impact in the vicinity of the concrete foundations has been removed through the incorporation of the requirement for sulphate-resistant concrete to be used within the draft CDMS.

11.152 The residual impact is therefore considered to be of **negligible significance**.

Modifications to the Catchment and In-stream Hydrology

11.153 The entire Site infrastructure would be located outside the Indicative River & Coastal Flood Map (Scotland) 1 in 200 year flood zone. The flood mitigation ensures any temporary land take areas would be fully reinstated following the construction period to reduce the areas of semi-impermeable surfaces. As demonstrated within the potential impact section, the increase in impermeable/semi-impermeable surfaces would not change the flood response within the sub-catchments. The Site drainage design also ensures runoff to the surrounding land would be attenuated to Greenfield Rates, as detailed within **Technical Appendix 11.3**. Therefore the residual magnitude of change would be negligible.

11.154 The potential for reduced cross track sub-surface flows through the peat and subsequent drying and oxidation of peat deposits has been reduced through the use of the Site drainage design mitigation and floating tracks (if required), to a low magnitude of change. Additionally, the access track design ensures that the track gradient is less than 8 %. Where slopes of a gradient greater than 8 % are intersected, the track contours to ensure the track gradient is less than 8 %, as presented on Figure 11.4. Thus the significance of the residual impact would be minor, which is not significant.

11.155 The significance of this residual impact is therefore considered to be of **negligible significance**.

Private Water Supplies

11.156 The Muckle Lyne Supply is located 1.3 km north of Turbine 20 and approximately 1.7 km downstream of Turbine 20 via natural flow pathways into the Stripe of Muckle Lyne. Given the distance from the abstraction location, the shallow gradients of the Site providing natural attenuation for any sediment-laden runoff generated during construction, and incorporation of the proposed mitigation measures, it is considered that there would be a small magnitude of change to the quality of the Muckle Lyne water supply. This is considered to be of **minor significance**.

Groundwater Dependent Terrestrial Ecosystems

11.157 Appropriate drainage design would ensure that cross track flow and flow around other impermeable infrastructure would be maintained at Greenfield rates, such that the supply of water available to the ecosystems present is not significantly reduced. As detailed in the residual construction impacts, it is considered that there would be no reduction in the ZoC following implementation of the drainage design (see **Technical Appendix 11.3**). The operational pollution prevention and emergency response plan would ensure that there is a negligible magnitude of change to water quality. Therefore the significance would **negligible**, which is not significant.

Carbon Balance

11.158 As detailed in **Technical Appendix 11.1**, the proposed wind farm is likely to produce a certain amount of CO_2 emissions, mainly from the construction phase, where carbon rich soils are excavated to construct foundations, access tracks and other infrastructure, or where changes to the hydrology of the site cause some loss of carbon from soils. However, the calculations indicate that these losses would be paid back within approximately 1 year of operation, through displacement of fossil fuel generated electricity in the National Grid.

Cumulatives

11.159 A hydrological cumulative impact assessment is based upon other developments located within the sub-catchments draining the Site. As described in Table 11.10, there are a total of 18 wind farm developments, located outwith the sub-catchments draining the Site.

Table 11.10: Cumulative Developments

Development	Location	Distance from Cairn Duhie (km)	Status	Turbine Number
Hill of Glaschyle	NJ036480	6.5	Application Submitted	12
Berry Burn	NJ082441	9.5	Under Construction	29
Tom nan Clach	NH859351	13.2	Consented	17
Pauls Hill – Phase 1 & 2	NJ117413	13.4	Operational	28
Cluny Farm	NJ067545	13.8	Consented	1
Bognie Farm	NJ069557	14.8	Operational	1
Moy	NH792371	18.7	Consented	20
Rothes – Phase 2	NJ181507	19.5	Under Construction	18
Rothes – Phase 1	NJ183507	20.5	Operational	22
Kellas	NJ176518	21.1	Application Submitted	8
Findhorn	NJ059641	21.6	Operational	4
Hunthill	NJ237469	25.5	Consented	4
Glen Kyllachy	NH732278	26.0	Application Submitted	20
Farr	NH736290	27.0	Operational	40
Brown Muir	NJ265543	29.7	Application Submitted	19

Table 11.10: Cumulative Developments				
Development	**Location**	**Distance from Cairn Duhie (km)**	**Status**	**Turbine Number**
Fearndearn	NJ305445	32.0	Appeal/Public Inquiry	1
Allt Duine	NH789117	32.8	Appeal/Public Inquiry	31
Dorenell	NJ323292	34.5	Consented	59

11.160 Two of the developments, Hill of Glaschyle and Berry Burn, also drain to the River Findhorn via the Dorback Burn. The greatest potential disturbance to the Dorback Burn would be during construction, when if all three developments were constructed simultaneously there would be a total of 61 turbines within the Dorback Burn catchment. Any cumulative effects would occur at the confluence where the watercourses draining these developments meet. The catchment area of the Dorbrack Burn at this confluence (NJ010472) is 162 km², thus any potential impacts would be significantly diluted. Therefore there would be no cumulative effects from these developments.

11.161 A number of the other developments (Glen Kyllachy, Moy and Tom nan Clach) are located upstream of the Site and also drain to the River Findhorn. In total there would be 77 turbines associated with the developments draining to the River Findhorn. The total catchment area for the River Findhorn where any cumulative effects could occur (NJ000498) is 595 km². Thus any potential impacts would be significantly diluted, such that there would be no cumulative effects from the construction and operation of these developments.

11.162 The remaining developments listed in Table 11.11 are not hydrologically connected to the Proposed Wind Farm Development and will not be considered further.

Summary

11.163 Table 11.11 presents a summary of potentially significant impacts, mitigation proposed and the residual significance. The assessment infers that the construction, operation and long term impacts of the Proposed Wind Farm Development are Minor or Negligible which is considered not to be significant.

Table 11.11: Summary of Potential Impacts of the Proposed Wind Farm Development, Mitigation and Residual Impacts			
Likely Significant Effects	**Mitigation Proposed**	**Means of Implementation**	**Outcome/Residual Effects**
Construction			
Increased sediment loads and acidification within runoff from disturbed ground, spoil heaps and excavations.	Layout has been designed to ensure construction is away from watercourses, and implementation of the runoff and sediment control measures.	CDMS	Minor Significance
Accidental spillage/loss of chemicals and other construction materials.	Construction pollution prevention, water quality monitoring and procedures in the event of a spill plan.	CDMS	Minor Significance
Reduced water quality of the private water supplies receiving runoff from the Site.	No construction shall take place within the 250 m of any abstractions. Implementation of the runoff and sediment control measure, the construction pollution prevention, water quality and monitoring and procedures in the event of a spill.	CDMS	Minor Significance
Disconnection of water supply to GWDTE.	Site drainage design and the layout have been designed to minimise, where possible, infrastructure within 100 m from roads, tracks and trenches or 250 m from foundations.	CDMS and Layout Design Constraints.	Minor Significance
Operational			
Accidental spillages/loss of chemicals or hydrocarbons.	Operational pollution prevention, water quality monitoring and emergency response plan.	Operational pollution prevention, water quality monitoring and emergency response plan	Negligible Significance
Reduced water quality of the private water supplies receiving runoff from the Site.	Operational pollution prevention, water quality monitoring and emergency response plan.	Operational pollution prevention, water quality monitoring and emergency response plan	Minor Significance
Long Term			
Erosion of site infrastructure and surrounding soils and peat. Drying and oxidation of peat deposits leading to peat degradation and further enhanced erosion.	Layout design and site drainage design measures.	CDMS	Negligible Significance
Leaching of concrete foundations.	Use of sulphur resistant concrete.	CDMS	None

Table 11.11: Summary of Potential Impacts of the Proposed Wind Farm Development, Mitigation and Residual Impacts			
Likely Significant Effects	**Mitigation Proposed**	**Means of Implementation**	**Outcome/Residual Effects**
Changes to runoff and peak flow through increased impervious surfaces across catchments.	Appropriate Drainage Design.	CDMS	Negligible Significance
Reduced water quality and quantity of the private water supplies receiving runoff from the Site.	Layout design and appropriate site drainage measures and site drainage design.	CDMS	Minor Significance
Disconnection of water supply to GWDTE.	Site drainage design and the layout has been designed to minimise, where possible; 100 m from roads, tracks and trenches or 250 m from foundations.	CDMS and Layout Design Constraints	Negligible Significance

12 Noise

Introduction

12.1 This chapter contains an assessment of the potential acoustic impact of the Proposed Wind Farm Development. The chapter assesses wind farm operational noise and its impacts upon the most acoustically sensitive neighbours in addition to noise impacts during the construction period. Decommissioning is not discussed separately as noise levels resulting from it are expected to be lower than those from the construction activity. Potential noise impacts associated with off-site road improvements are described in **Chapter 14: Access, Traffic and Transport**.

12.2 This assessment has been undertaken by RES, with at least two in-house Members of the Institute of Acoustics involved in its production. Legislation and Policy Context

Wind Turbine Noise

12.3 Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be completely masked by wind-generated background noise such as the sound of wind blowing through trees and around buildings.

12.4 As described by the Scottish Government in Onshore Wind Turbines Renewable Advice (Scottish Government, 2012):

12.5 "*Technically, there are two quite distinct types of noise sources within a wind turbine - the mechanical noise produced by the gearbox, generator and other parts of the drive train; and the aerodynamic noise produced by the passage of the blades through the air. There has been significant reduction in the mechanical noise generated by wind turbines through improved turbine design.*" (Scottish Government, 2012)

Construction Noise

12.6 The sources of construction noise, which are temporary, will vary both in location and their duration as the different elements of the wind farm are constructed and will arise primarily through the operation of large items of plant.

12.7 Noise will also arise due to the temporary increase in construction traffic near the Site; this level also depends on what different elements of the wind farm are being constructed.

Experience

12.8 RES has undertaken acoustic impact assessments in every single one of its UK wind farm development applications since 2000, totalling more than 30 wind farm applications. RES has also carried out noise assessments and reported to several local authorities on wind energy projects including taking measurements on newly constructed wind farms to ensure compliance with planning conditions.

12.9 Additionally, RES has been project co-ordinator for several Joule[1] projects, leading European research into wind turbine noise and was involved in producing the guideline 'The Assessment and Rating of Noise from Wind Farms' (ETSU, 1996)[2] for the Department of Trade and Industry (DTI) in 1996. For example, such papers include:

- An Investigation of Blade Swish from Wind Turbines, P Dunbabin, Proceedings of the 1996 International Congress on Noise Control Engineering (Internoise '96), 30 July – 2 August 1996, Book 1, pp 463 – 469;
- An Automated System for Wind Turbine Tonal Assessment, R Ruffle, Proceedings of the 1996 International Congress on Noise Control Engineering (Internoise '96), 30 July – 2 August 1996, Book 6, pp 2997 – 3002;
- Wind Turbine Measurements for Noise Source Identification, ETSU W/13/003914/00.REP, 1999, Dr P Dunbabin, RES et al;
- A Critical Appraisal of Wind Farm Noise Propagation, ETSU W/13/00385/REP, 2000 Dr J Bass, RES;
- Aerodynamic Noise Reduction for Variable Speed Turbines, ETSU/W/45/00504/REP, 2000, Dr P Dunbabin, RES; and
- Fundamental research in amplitude modulation - a project by RenewableUK, Wind Turbine Noise 2011 (Dr J Bass, steering group member).

Scope of Assessment

12.10 Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities. The effect of noise, both in the construction phase and the operational phase, is therefore a material consideration in the determination of planning applications.

Operational Noise

12.11 The main focus of the acoustic impact assessment of operational noise from the Proposed Wind Farm Development presented here is based on the two most relevant types of noise immission for modern wind turbines: broadband; and tonal noise, both of which are types of 'audible noise'. Implicitly incorporated within this assessment is the normal character of the noise associated with wind turbines (commonly referred to as "swish") and consideration of a range of noise frequencies, including low frequencies.

Low Frequency Noise

12.12 The frequency range of 'audible noise' is generally taken to be 20 Hz to 20,000 Hz, with the greatest sensitivity to sound typically in the central 500 Hz to 4,000 Hz region. The range

[1] DGXII European Commission funded projects in the field of Research and Technological Development in non-nuclear energy

[2] ETSU, 1996. "The Assessment and Rating of Noise from Wind Farms", The Working Group on Noise from Wind Turbines, ETSU Report for the DTI, ETSU-R-97

from 10 Hz to 200 Hz is generally used to describe 'low frequency noise', and noise with frequencies below 20 Hz used to describe 'infrasound' (Leventhall, 2003)[3], although there is sometimes a lack of consistency regarding the definition of these terms in both common usage and the literature.

Low frequency noise is always present, even in an ambient 'quiet' background (Leventhall, 2003)[3]. It is generated by natural sources, including the sea, earthquakes, the rumble of thunder and wind. It is additionally an emission from many artificial sources found in modern life, such as household appliances (e.g. washing machines, dishwashers) and all forms of transport.

12.13 Noise emitted from wind turbines covers a broad spectrum from low to high frequencies. In relation to human perception of the broadband noise produced by wind turbines, the dominant frequency range is not the low frequency or infrasonic ranges (Ontario Ministry of the Environment, 2010)[4]. The reason for this is that the perception threshold for hearing in these ranges is much higher than for speech frequencies of between 250 Hz and 4000 Hz. As a result of this decreased sensitivity, wind turbine noise at the lowest frequencies of the range described as 'low frequency noise' would be below the average hearing threshold.

12.14 A comprehensive literature review of 'Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems', undertaken for the Ontario Ministry for the Environment in 2010, indicates that low frequency noise from wind turbines crosses the threshold boundary, and thus would be considered to become audible, above frequencies of around 40-50 Hz (Ontario Ministry of the Environment, 2010)[4]. The degree of audibility depends upon the wind conditions, the degree of masking from background noise sources and the distance from the wind turbines (Ontario Ministry of the Environment, 2010)[4].

12.15 Although audible under some conditions, a paper; 'Infrasound and low frequency noise from wind turbines: exposure and health effects' (Bolin et al, 2011)[5], published by the authors of a literature review on the subject prepared for the Swedish Environmental Protection Agency in 2011 (SEPA, 2011[6]), concludes that the level of low frequency noise produced by wind turbines does not exceed levels from other common sources, such as road traffic noise (Bolin et al, 2011)[5].

12.16 In response to an article published in the national press in 2004, alleging that low frequency noise from wind turbines may give rise to adverse health effects, the DTI commissioned the Hayes McKenzie Partnership to perform an independent study to investigate these claims (Hayes, 2006)[7]. The Government released the following advice based on the report's findings:

"*The report concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines.*" (DTI, 2006)[8]

12.17 This is re-iterated in the review undertaken for the Ontario Ministry for the Environment (Ontario Ministry of the Environment, 2010)[4], which concludes that publications by medical professionals indicate that; at typical setback distances, the noise levels produced by wind turbines, including noise at low and infrasound frequencies, do not represent a direct health risk (Ontario Ministry of the Environment, 2010).

12.18 Whilst low frequency content of the noise from wind farms shall be considered through the use of octave band specific noise emission and propagation modelling within the assessment presented here, it is considered that specific and targeted assessment on low frequency content of noise emissions from the proposed wind farm development is unjustified.

Infrasound

12.19 In relation to infrasound in general; frequencies below 20 Hz may be audible, although tonality is lost below 16-18 Hz, thus losing a key element of perception (Leventhall, 2003)[3]. In relation to modern, upwind turbines; there is strong evidence that the levels of infrasound produced will be well below the average threshold of human hearing (Ontario Ministry of the Environment, 2010)[4]. The aforementioned DTI report[8] extended this conclusion to more sensitive members of the population:

"*Even assuming the most sensitive members of the population have a hearing threshold which is 12 dB lower than the median hearing threshold, measured infrasound levels are well below this criterion*" (Hayes, 2006)[7].

As such:

"*infrasound from wind turbines is not audible at close range and even less so at distances where residents are living*" (Bolin et al, 2011)[5].

12.20 In February 2005, the BWEA[9] published background information on low frequency noise from wind farms (BWEA, 2005)[10]. The conclusion states that:

"*It has been repeatedly shown, by measurements of wind turbine noise undertaken in the UK, Denmark, Germany and the USA over the past decade, and accepted by experienced noise professionals, that the levels of infrasonic noise and vibration radiated from modern upwind configuration wind turbines are at a very low level; so low that they lie below the threshold of perception, even for those people who are particularly sensitive to such noise, and even on an actual wind turbine site*" (BWEA, 2005)[10].

The BWEA report goes on to quote Dr Geoff Leventhall, author of the DEFRA report on "Low Frequency Noise and its Effects" (BWEA, 2005), as saying:

[3] Leventhall, 2003. "A Review of Published Research on Low Frequency Noise and Its Effects", Report for DEFRA

[4] Ontario Ministry of the Environment, 2010. "Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems, a Literature Review", OSS078696, December 2010

[5] Bolin et al, 2011. "Infrasound and low frequency noise from wind turbines: exposure and health effects", Environmental Research Letters 6, September 2011

[6] SEPA, 2011. "A literature review of infra and low frequency noise from wind turbines: exposure and health effects", prepared for Swedish Environmental Protection Agency, November 2011

[7] Hayes, 2006. "The Measurement of Low Frequency Noise at Three UK Wind Farms", Contract Number W/45/00656/00/00, URN 06/1412, www.berr.gov.uk/files/file31270.pdf

[8] DTI, 2006. "Advice on findings of the Hayes McKenzie report on noise arising from Wind Farms", URN 06/2162, dated November 2006, www.berr.gov.uk/files/file35592.pdf

[9] BWEA is now known as RenewableUK, a group representing the concerns of companies in the Renewable Energy Industry

[10] BWEA, 2005. "Low Frequency Noise and Wind Turbines", The British Wind Energy Association, www.bwea.com/ref/lowfrequencynoise.html& Technical Annex www.bwea.com/pdf/lfn-annex.pdf

"*I can state, quite categorically, that there is no significant infrasound from current designs of wind turbines*" (BWEA, 2005).

12.21 With regard to health effects, the DTI report quotes the document 'Community Noise', prepared for the World Health Organisation (WHO), which states that:

"*there is no reliable evidence that infrasound below the hearing threshold produce physiological or psychological effects*" (Hayes, 2006)[7].

The DTI report goes on to conclude that:

"*infrasound associated with modern wind turbines is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbour*" (Hayes, 2006).

12.22 Furthermore, researchers at Keele University explain that:

"*The infrasound generated by wind turbines can only be detected by the most sensitive equipment, and again this is at levels far below that at which humans will detect the low frequency sound. There is no scientific evidence to suggest that infrasound has an impact on human health.*" (Styles and Toon, 2005)[11]

12.23 Therefore, in accordance with literature, it is not considered appropriate or relevant to undertake specific assessment in relation to infrasound for the proposed wind farm development.

Vibration

12.24 Structure borne noise, originating in vibration, is also low frequency, as is neighbour noise heard through a wall, since walls generally block higher frequencies more than lower frequencies.

12.25 A report by Snow gives details of low frequency noise and vibration measurements made at a wind farm (Snow, 1997)[12]. Measurements were made both on the wind farm site, and at distances of up to 1 km. It was found that the vibration levels at 100 m from the nearest turbine itself were a factor of 10 lower than those recommended for human exposure in the most critical buildings (i.e. laboratories for precision measurements), and lower again than the limits specified for residential premises (BSI, 1992)[13]. Noise and vibration levels were found to comply with recommended residential criteria, even on the wind turbine site itself, and the acoustic signal was below the generally assumed frequency range of audible noise i.e. below 20 Hz. In addition, it was found that there was no clear relationship between vibrational levels and wind speed, and that some vibrations appeared to come from other sources, as they were found even when the turbines were switched off.

12.26 More recently, in 2004/2005, researchers at Keele University investigated the effects of the extremely low levels of vibration resulting from wind farms on the operation of the seismic array at Eskdalemuir - one of the most sensitive such installations in the world. The results of this study have frequently been misinterpreted and, to clarify the position, the authors have explained that:

"*The levels of vibration from wind turbines are so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect*" (Styles & Toon, 2005)[11].

They go on to say:

"*Vibrations at this level and in this frequency range will be available from all kinds of sources such as traffic and background noise - they are not confined to wind turbines. To put the level of vibration into context, they are ground vibrations with amplitudes of about one millionth of a millimetre. There is no possibility of humans sensing the vibration and absolutely no risk to human health*" (Styles & Toon, 2005).

12.27 Therefore, in accordance with literature, it is not considered appropriate or relevant to undertake specific assessment in relation to vibration caused by the operation of the proposed wind farm development.

Aerodynamic Modulation

12.28 The noise normally associated with wind turbines and commonly referred to as "Swish" is the modulation of aerodynamic noise produced at blade passing frequency (the frequency at which a blade passes a fixed point). This noise character is acknowledged by, and accounted for, in the recommendations of ETSU R 97 (ETSU, 1996)[2]. However the aforementioned DTI report (Hayes, 2006) researching low frequency noise and/or infrasound emitted by wind turbines noted that a related phenomenon known as 'Amplitude Modulation' (AM), was, in some isolated circumstances, occurring in ways not anticipated by ETSU-R-97. Such AM above and beyond that considered by ETSU-R-97 is often referred to as Excess, or Other AM.

12.29 To investigate whether or not Other AM was an issue which might require attention in the context of the rating advice in ETSU-R-97, the Government subsequently commissioned the University of Salford to undertake further research in the area (DTI, 2006)[8].

On 1 August 2007, the Government issued a statement (BERR, 2007) regarding the findings of the University of Salford report into "Other AM" of wind turbine noise (University of Salford, 2007)[14] published earlier in 2007 which found that, of 133 operational wind farms in the UK at the time of the report, there were only four cases where AM may have been a factor. It is known that complaints have now subsided for three of these cases (one due to introduced mitigation by a wind farm control system) and in the remaining case a settlement has been reached. The statement says that:

"*…the Government does not consider there to be a compelling case for further work into AM and will not carry out any further research at this time.*"

[11] Styles, & Toon, 2005. "Wind farm noise" printed in the Scotsman newspaper as a rebuttal of claims made by the Renewable Energy Foundation, August 2005

[12] Snow, 1997. "Low Frequency Noise & Vibration Measurements at a Modern Wind farm", ETSU W/13/00392/REP

[13] BSI, 1992. "Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)", British Standards Institution, BS 6472

[14] University of Salford, 2007. "Research into Aerodynamic Modulation of Wind Turbine Noise: Final Report", URN 07/1235, dated July 2007, www.berr.gov.uk/files/file40570.pdf

In consequence the statement (BERR, 2007) makes it clear that the approach contained in the ETSU R-97 report, to assess and rate noise from wind energy developments, is still recommended.

12.30 As the occurrence of Other AM at any given site and the frequency of the occurrence at sites where it is acknowledged to exist is low, it is RES's opinion that a specific noise condition relating to Other AM is not required on the planning basis of necessity. Should the unlikely event occur that Other AM manifests at this site and gives rise to complaint it should be noted that action could still be taken against the wind farm operator via statutory nuisance legislation.

12.31 Therefore, in accordance with literature and advice, it is not considered appropriate or relevant to undertake specific assessment in relation to AM above and beyond that considered by ETSU-R-97 that may be potentially produced by the operation of the proposed wind farm.

Wind Turbine Syndrome

12.32 The condition proposed by paediatrician Dr Nina Pierpont in her report 'Wind Turbine Syndrome: A Report on a Natural Experiment' (Pierpont, 2009)[15] cites a range of physical sensations and effects as being caused by living near a wind farm. This study is based on a series of interviews comprising a study group of 10 families. It is a self published report with none of the research being published in any peer reviewed medical journals.

12.33 In a NHS response to the Pierpont report, a report titled 'Are wind farms a health risk?' (NHS, 2009)[16] states that there is no conclusive evidence that wind turbines have an effect on health or are causing the set of symptoms described as 'wind turbine syndrome'. It was noted that the group study by Pierpont was not sufficient to justify the claims stated.

12.34 A scientific advisory panel conducted a review of current literature available on the issue of perceived health effects of wind turbines 'Wind Turbine Sound and Health Effects - An Expert Panel Review' (Colby, 2009). This was carried out by the American and Canadian Wind Energy Associations and the conclusion on Wind Turbine Syndrome was that it is

"*not a recognized medical diagnosis, is essentially reflective of symptoms associated with noise annoyance and is an unnecessary and confusing addition to the vocabulary on noise.*"

The report went on to say:

"*There are no unique symptoms or combinations of symptoms that would lead to a specific pattern of this hypothesized disorder.*"

12.35 An independent review of the state of knowledge about the alleged health condition was carried out (RenewableUK, 2010)[17]. This report includes three expert opinions provided by: Richard J.Q. McNally - Reader in Epidemiology at the Institute of Health and Society Newcastle University; Geoff Leventhall – an independent consultant specialising in low frequency noise, infrasound and vibration; and Mark E. Lutman - Professor of Audiology at the University of Southampton. Their critique of Pierpont's study concludes that the reported symptoms are the effects mediated by stress and anxiety when exposed to an adverse element in their environment. There is no evidence that they are patho-physiological effects of wind turbine noise.

12.36 A paper by Pedersen explores data from three cross-sectional studies comprising A weighted sound pressure levels of wind turbine noise, and subjectively measured responses from 1,755 people, to find the relationships between sound levels and aspects of health and well-being. It was concluded that there is no consistent association between wind turbine noise exposure and the symptoms associated with Wind Turbine Syndrome (Pedersen, 2011)[18].

12.37 Therefore, in accordance with literature, it is not considered appropriate or relevant to undertake specific assessment in relation to Wind Turbine Syndrome potentially caused by the operation of the proposed wind farm.

Construction Noise

12.38 The acoustic impact assessment of construction noise from the wind farm presented here is based on the operation of the primary large items of construction equipment. Additionally, consideration is given to the increased noise levels due to increased traffic flows during the construction phase to and from the Site.

12.39 Whilst noise will also arise during decommissioning of the wind farm (through turbine deconstruction and breaking of the exposed part of the concrete bases) this is not discussed separately as noise levels resulting from it are expected to be lower than those from the construction activity.

Legislation and Policy Context

Operational Noise

12.40 Within Scotland, noise is defined within the planning context by 'Planning Advice Note 1/2011: Planning and Noise' (PAN 1, 2011)[19]. This Planning Advice Note provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. It supersedes Circular 10/1999 Planning and Noise and PAN 56 Planning and Noise. The Planning Advice Note 1/2011 states that:

"*Good acoustical design and siting of turbines is essential to minimise the potential to generate noise*"

12.41 For wind turbines in Scotland the Planning Advice Note 1/2011 refers to the use of the DTI's 'The Assessment and Rating of Noise from Wind Farms' (ETSU, 1996)[2], hereafter referred to as 'ETSU-R-97', in the web based planning advice on renewable technologies for Onshore

[15] Pierpont, 2009. "Wind Turbine Syndrome - A Report on a Natural Experiment", K-Selected Books.

[16] NHS, 2009. "Are wind farms a health risk?", www.nhs.uk/news/2009/08August/Pages/Arewindfarmsahealthrisk.aspx

[17] RenewableUK, 2010. "Wind Turbine Syndrome (WTS) - An independent review of the state of knowledge about the alleged health condition", www.bwea.com/pdf/publications/HS_WTS_review.pdf

[18] Pedersen, 2011. "Health aspects associated with wind turbine noise—results from three field studies" Noise Control Engineering Journal, Volume 59, Issue 1

[19] PAN 1, 2011. "Planning Advice Note 1/2011: Planning and Noise", Scottish Government policy, March 2011

wind turbines (Scottish Government, 2012)[20]. In relation to noise from wind farms the web-based renewables advice states:

The Report, "The Assessment and Rating of Noise from Wind Farms" (Final Report, Sept 1996, DTI), (ETSU-R-97), describes a framework for the measurement of wind farm noise, which should be followed by applicants and consultees, and used by planning authorities to assess and rate noise from wind energy developments, until such time as an update is available.

12.42 It is therefore considered that the use of ETSU-R-97, as criteria for assessment of wind farm noise, fulfils the requirements of Planning Advice Note 1/2011.

12.43 The methodology described in ETSU-R-97 was developed by a working group comprised of a cross section of interested persons including, amongst others, environmental health officers, wind farm operators and independent acoustic experts.

12.44 The guidance makes it clear from the outset that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that arise through the development of renewable energy resources. The principle of balancing development needs against protection of amenity may be considered common to any type of noise control guidance.

12.45 The basic aim of ETSU-R-97, in arriving at the recommendations contained within the report, is the intention to provide:

"*Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities.*" (ETSU, 1996) [2]

12.46 ETSU-R-97 provides a robust basis for assessing the noise impact of a wind farm and has been applied at the vast majority of wind farms currently operating in the UK and is proposed as adequate for use in this assessment. This approach is consistent with relevant planning policy and has been agreed with Environmental Health Officers from THC and Moray Council, as appropriate – refer to paragraph 12.51 on consultation.

12.47 An article published in the Institute of Acoustics Bulletin Volume 34 No 2, March/April 2009 (Institute of Acoustics, 2009)[21], recommends a methodology for addressing issues not made explicit by, or outside the scope of, ETSU-R-97 – such as in relation to wind shear or noise propagation modelling. This article was authored by a group of independent acousticians experienced in wind farm noise issues working for both wind farm developers, local planning authorities and third parties. The assessment presented herein adopts the recommendations made within this article.

12.48 The Good Practice Guide, issued by the Institute of Acoustics in May 2013 and endorsed by the Scottish Executive, provides guidance on all aspects of the use of ETSU-R-97 and reaffirms the recommendations of the Acoustics Bulletin article with regard to propagation modelling and wind shear (Institute of Acoustics, 2013)[22]. The assessment presented herein adopts the recommendations made within the Acoustics Bulletin article and the Good Practice Guide.

Construction Noise

12.49 In the web based Scottish Government technical advice on construction noise assessment in 'Appendix 1: Legislative Background, Technical Standards and Codes of Practice' (Scottish Government, 2011) it is stated that:

"*under Environmental Impact Assessments and for planning purposes i.e. not in regard to the Control of Pollution Act 1974, the 2009 version of BS 5228 is applicable*".

This refers to BS 5228-1:2009 'Noise control on construction and open sites' Part 1 – Noise (BSI, 2009)[23] and is identified as being suitable for the purpose of giving guidance on appropriate methods for minimising noise from construction activities, and is adopted herein.

12.50 The legislation Control of Pollution Act 1974 provides information on the need for ensuring that the best practicable means are employed to minimise noise (CoPA, 1974)[24].

Consultation

12.51 The consultation undertaken is outlined in Table 12.2.

Table 12.2: Acoustic Assessment Consultation

Consultee	Date of Consultation	Nature and Purpose of Consultation
The Highland Council and Moray Council	03/05/2013	Scoping report was sent from RES to The Highland Council (THC) and Moray Council.
The Highland Council	07/05/2013	Report "Planned Acoustic Assessment at the Proposed Cairn Duhie Wind Farm" from RES sent to the Environmental Health Officer (EHO) at THC, via email. To review methodology and locations for a background noise survey.
The Highland Council	07/05/2013	The EHO at THC sent an email confirming use of ETSU-R-97 as appropriate. Also included was THC policy entitled "Noise Assessment Guidance For Wind Farms" and stated that he planned on checking the background monitoring positions.
The Highland Council	13/05/2013	Email from the EHO at THC requesting that an additional survey location be found in the village of Ferness. The EHO also mentioned to

[20] PAN 45 Renewable Energy Technologies has been replaced with web based renewables advice

[21] Institute of Acoustics, 2009. "Prediction and Assessment of Wind Turbine Noise", Dr A Bullmore and M Jiggins (Hoare Lea Acoustics), Dr A McKenzie and M Hayes (Hayes McKenzie Partnership), D Bowdler (New Acoustics), R Davis (RD Associates) & Dr G Leventhall, Acoustics Bulletin Vol 34 No 2 March/April 2009

[22] Institute of Acoustics, 2013. "A Good Practice Guide to the Application of ETSU R 97 for the Assessment and Rating of Wind Turbine Noise", May 2013

[23] BSI, 2009. "Noise and vibration control on construction and open sites - Part 1: Noise", British Standards Institution, BS 5228-1:2009

[24] CoPA, 1974. "Control of Pollution Act 1974", published by Her Majesty's Stationery Office, 1974

Table 12.2: Acoustic Assessment Consultation		
Consultee	**Date of Consultation**	**Nature and Purpose of Consultation**
		be cautious about the potential influence of the river near Braemoray Lodge. The EHO checked the proposed survey locations and had no further comments to add about the other locations.
The Highland Council	14/06/2013	Scoping response received from THC which specified a 35dB(A) lower limit for quiet waking hours and a 38dB(A) limit for night-time hours.
The Highland Council	25/06/2013	Report "Noise Survey Locations for the Proposed Cairn Duhie Wind Farm" sent from RES to the EHO at THC via email.
The Highland Council	04/07/2013	Phone call made by RES to confirm survey locations. Comment was made about the representation of The Old School House for Head Foresters Cottage rather than Muckle Lyne
Moray Council	04/07/2013	Following scoping response from neighbouring council reports "Planned Acoustic Assessment at the Proposed Cairn Duhie Wind Farm" & "Noise Survey Locations for the Proposed Cairn Duhie Wind Farm" sent to the EHO at Moray Council, via email.
Moray Council	05/07/2013	Reply received from the EHO at Moray Council stating he planned to check locations with predicted noise levels >35dBA.
Moray Council	05/07/2013	Email was sent to the EHO at Moray Council to clarify that the background noise survey had already commenced.
Moray Council	31/07/2013	The EHO at Moray Council checked out the survey location in the Moray Council area at Braemoray Lodge and was satisfied with it. He asked about how wind was being measured on site.
Moray Council	31/07/2013	Email sent to the EHO at Moray Council to confirm that a LIDAR was on site to measure wind data.
Moray Council	09/10/2013	Meeting with the EHO at Moray Council to discuss and agree acoustic assessment prior to submitting the planning application.

Assessment Methodology

Method for Operational Noise Assessment

12.52 To ensure adequate assessment of the potential impacts of the operational noise from the proposed wind farm the following steps have been taken, in accordance with relevant guidance detailed above:

- The baseline noise conditions at each of the nearest neighbours to the wind farm are established by way of representative background noise surveys – refer to paragraph 12.80;
- The noise levels incident at the nearest neighbours due to the operation of the proposed wind farm using a sound propagation model are calculated giving due regard to: the locations of the wind turbines; the locations of the nearest, or most noise sensitive neighbours; &the likely noise emission characteristics of the wind turbines. Refer to paragraph 12.96;
- With due regard to relevant guidance or regulations the acoustic assessment criteria is derived – refer to paragraph 12.103; and
- The evaluation of the acoustic impact is undertaken by comparing the estimated noise levels with the noise assessment criteria – refer to paragraph 12.105

Method for Establishing Baseline Conditions

12.53 Similar to other assessments of noise impacts, most notably BS 4142, "The Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas" (BSI, 1997)[25] which ETSU-R-97 identifies as forming the basis of its recommendations, the ETSU-R-97 methodology recommended for assessment of wind farm noise is to compare likely noise levels due to turbine emissions (which vary with hub height wind speed) with noise limits based upon the noise levels existing under those same conditions (i.e. the baseline conditions).

12.54 Since background noise levels depend upon wind speed, as indeed do wind turbine noise emissions, it is important when making reference measurements to put them in that context. Thus, the assessment of background noise levels at potentially sensitive neighbouring locations requires the measurement of not only noise levels, but concurrent wind conditions, covering a representative range of wind speeds. These wind measurements are made at the wind turbine Site rather than at the properties, since it is this wind speed that will subsequently govern the wind farm's noise generation. Often the neighbouring properties themselves will be sheltered from the wind and will consequently have relatively low background noise.

12.55 To establish the baseline conditions, sound level meters and associated apparatus are set-up to record the required acoustic information at a selection of locations which are the most noise sensitive dwellings geographically spread around the Site and are likely to be representative of other houses in the locale.

12.56 This equipment is housed in weather-proof enclosures, and powered by lead-acid batteries. The microphones are placed at a height of approximately 1.2 m – 1.5 m above ground, and equipped with all weather wind shields to provide an element of water resistance.

12.57 Noise levels are monitored continuously, and summary statistics stored every 10 minutes in the internal memory of each meter. The relevant statistic measured is the $L_{A90,10min}$ (The A-weighted sound pressure level exceeded for 90 % of the 10 minute interval).

12.58 There were two separate background noise survey campaigns (see paragraph 12.80). For the survey carried out in 2004, wind speed and direction are recorded by a data logger mounted on a meteorological mast as 10 minute averages for the same period as for the noise measurements, and were synchronised with the acoustic data to allow correlations to be established. For the survey carried out in 2013, wind speed and direction are recorded by a LiDAR as 10 minute averages for the same period as for the noise measurements, and were synchronised with the acoustic data to allow correlations to be established (see paragraph

[25] BSI, 1997. "Method for rating industrial noise affecting mixed residential and industrial areas", British Standards Institution, BS 4142:1997

12.82). The wind speed that is adopted for use is the same wind speed as that which drives the turbine noise levels.

12.59 The adoption of this wind speed was presented as appropriate within the article published in the Institute of Acoustics Bulletin (Institute of Acoustics, 2009)[21] and the subsequent Good Practice Guide (Institute of Acoustics, 2013)[22].

12.60 Prior to establishing the baseline conditions the acoustic data is filtered as follows:

- For each background noise measurement location, the measured noise data have been divided into two sets, as specified by ETSU-R-97 and shown in Table 12.3:

Table 12.3: Definition of Time of Day Periods

Time of Day	Definition
Quiet waking hours	18:00 - 23:00 every day 13:00 - 18:00 Saturday 07:00 - 18:00 Sunday
Night-time hours	23:00 - 07:00 every day

- Rainfall affected data is systematically removed from the acoustic data set. For the 2004 survey, rain data from the Kinloss Meteorological station, approximately 24km north of the proposed wind farm, was used and for the 2013 survey, rain a LiDAR was deployed at site to record 10 minute rainfall data and identify potentially affected data.
- Periods of measured background noise data thought to be affected by extraneous noise sources, i.e. non-typical, and are generally identified by means of inference are removed from the acoustic data set. In practice this means close inspection of the measured background noise data and comparison with concurrent data measured at nearby locations. Such analysis considers directional and temporal variation in the background noise for all survey locations. Whilst some 'extraneous' data may actually be real, in practice it tends to bias any trend lines upwards, so its removal is adopted as a conservative measure.

Calculating Standardised Wind Speed

12.61 In order to derive appropriate noise limits the ETSU R 97 guidance requires the correlation of background noise survey data with wind speed data referenced to 10 m height. In contrast to this, acoustic emission measurements on wind turbines are undertaken following an international standard which specifies that the turbine noise emission should be reported as a function of a 'standardised' wind speed at 10 m height. In practice this translates as extrapolation of wind speed at hub height down to 10 m height, using a specified, and fixed, relationship.

12.62 However, whilst there are good reasons for this approach, for example it allows developers to compare noise emission data from different makes and models of wind turbine, it does create potential problems. If for example, the wind shear on a site where the turbines are to be deployed differs from the assumed values/model, the result is that, for a given 'standard' wind speed at 10 m height, the hub height wind speed may be very different. The consequence is that the turbine generates a different amount of power, and emits a different level of sound power, than might be expected from the standardised wind speed alone.

12.63 Two options are available in order to reconcile potential anomalies:

- The turbine sound power levels are re-calculated taking due consideration of site-specific wind shear; and
- The noise limits are derived with reference to the same wind speed as the turbine noise levels.

12.64 In this assessment RES have chosen to apply the second option. This approach was presented as appropriate by a group of independent acoustic consultants working for both wind farm developers, local planning authorities and third parties in an article published in the Institute of Acoustics Bulletin (Institute of Acoustics, 2009)[21] and the subsequent Good Practice Guide (Institute of Acoustics, 2013)[22]. The methodology outlined below therefore is employed to those wind speeds measured on-site concurrently with the background noise survey:

- Wind Speeds are Calculated for Hub Height.
  - Where hub height wind speed has not been directly measured this may be estimated by extrapolating the wind speed measured at the uppermost anemometer, or at an appropriate height by a remote sensing device, to the hub height by use of the measured wind shear exponent. The wind shear exponent is a commonly used, empirically based, engineering description of the rate of change of wind speed with height and may vary according to atmospheric conditions and be affected by interactions between ground features and the wind flow.
  - It therefore follows that the hub height wind speed for each 10-minute period may be calculated from the wind speed measured at the uppermost anemometer, or at an appropriate height by a remote sensing device, and the calculated wind shear exponent.
- "Standardised" 10 m Wind Speeds are Calculated.
  - The reporting of wind turbine noise emissions are carried out according to the international standard IEC 61400-11, "Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques". This standard specifies that the sound power level for the turbine is reported as a function of the 'standardised' wind speed at 10 m height. It should be noted that this standardised wind speed is not the wind speed that would be expected to be measured at 10 m height for any specific hub height wind speed, rather better considered as a proxy for the hub height wind speed (the primary driver of noise emission from the turbine).
  - The 'standardised' wind speed is calculated by extrapolating the hub height wind speed to 10 m height.
- Correlation of "Standardised" 10 m Wind Speeds with Background Noise Data.

- The standardised 10 m wind speed is correlated with the measured background noise survey data.

Method for Modelling noise Propagation

12.65 Whilst there are several sound propagation models available, here RES has used the ISO 9613 Part 2 model (ISO, 1996)[26], this being identified as most appropriate for use in such rural sites (ETSU, 2000)[27]. The specific interpretation of the ISO 9613 Part 2 propagation methodology has been employed as in the aforementioned Institute of Acoustics bulletin article (Institute of Acoustics, 2009)[21] and the subsequent Good Practice Guide (Institute of Acoustics, 2013)[22].

12.66 To make noise predictions it is assumed that:

- the turbines are identical;
- the turbines radiate noise at the power specified in this chapter;
- each turbine can be modelled as a point source at hub-height; and
- each dwelling is assigned a reference height to simulate the presence of an observer.

12.67 The model takes account of:

- attenuation due to geometric spreading;
- atmospheric absorption;
- ground effects; and
- barrier effects.

12.68 The barrier attenuations predicted by ISO 9613 Part 2 have been shown to be significantly greater than those measured in practice under downwind conditions (ETSU, 2000)[27]. Therefore, barrier attenuation according to the ISO 9613 Part 2 method has been discounted. In lieu of this, where there is no direct line of sight between the property in question and any part of the wind turbine a 2 dB attenuation has been assumed, as recommended in the aforementioned Institute of Acoustics bulletin article (Institute of Acoustics, 2009)[21] and the subsequent Good Practice Guide (Institute of Acoustics, 2013)[22].

12.69 To generate the ground cross sections between each turbine and each dwelling necessary for reliable propagation modelling, ground contours at 5 m intervals for the area of interest have been generated from 50 m grid resolution digital terrain data.

12.70 The predicted noise levels are changed from the L_{Aeq} to the L_{A90} descriptor (to allow comparisons to be made) by the use of an adjustment factor of -2 dB(A), as specified by ETSU-R-97.

12.71 It has been shown, by measurement based verification studies that the ISO 9613 Part 2 model tends to slightly over-estimate noise levels at nearby dwellings (ETSU, 2000)[27]. Examples of additional conservatism modelled are:

- downwind propagation is modelled in all directions. In reality, noise propagation biases towards downwind locations, therefore predicted values are over-estimations upwind and crosswind of the proposed wind turbines;
- although, in reality, the ground is predominantly porous (acoustically absorptive) it has been modelled as 'mixed', i.e. a combination of hard and porous, corresponding to a ground absorption coefficient of 0.5 as recommended by the Institute of Acoustics bulletin article (Institute of Acoustics, 2009)[21] and the subsequent Good Practice Guide (Institute of Acoustics, 2013)[22];
- receiver heights are modelled at 4.0 m above local ground level, which equates roughly to first floor window level. This results in a predicted noise level anything up to 2 dB(A) higher than at the 'standard' assessment height of 1.2 - 1.8 m;
- trees and other non-terrain shielding effects have not been considered, whereas in practice, these elements will provide more shielding and result in lower noise levels than those predicted;
- a measurement uncertainty factor of +1dB has been added to the sound power levels of all wind turbines.

Method for Deriving the Assessment Criteria

12.72 Noise is measured in decibels (dB) which is a measure of the sound pressure level, i.e. the magnitude of the pressure variations in the air. Measurements of environmental noise are usually made in dB(A) which includes a correction for the sensitivity of the human ear.

Planning Advice Note PAN 1/2011: Planning and Noise (PAN 1, 2011)[19] states:

"*Measurements in dB(A) broadly agree with people's assessment of loudness. For noise of a similar character, a change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound.*"

12.73 In accordance with the recommendations of ETSU-R-97, the acceptance of the proposed wind farm is established by comparing the noise levels produced by the combined operation of the wind turbines with appropriate noise limits at nearby residential properties.

12.74 Whilst ETSU-R-97 presents a comprehensive and detailed assessment methodology for wind farm noise, it also states a simplified methodology:

"*if the noise is limited to an $L_{A90,10min}$ of 35dB(A) up to wind speeds of 10 m/s at 10 m height, then these conditions alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary*" (ETSU, 1996)[2].

12.75 In the detailed methodology, ETSU-R-97 states that different limits should be applied during quiet waking and night-time hours. The quiet waking hour's limits are intended to preserve outdoor amenity, while the night-time limits are intended to prevent sleep disturbance. The general principle is that the noise limits should be based on existing background noise levels, except for very low background noise levels, in which case a fixed limit may be applied. The suggested limits are given below, where L_B is the background $L_{A90,10min}$ and is a function of

[26] ISO, 1996. "Acoustics - Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation", International Organisation for Standardisation, ISO 9613-2:1996

[27] ETSU, 2000. "A Critical Appraisal of Wind Farm Noise Propagation", ETSU Report W/13/00385/REP

wind speed. During quiet waking hours and at low background noise levels, a permissible noise level of 35 - 40 dB(A) should be used, as shown in Table 12.4. The exact value is dependent upon a number of factors: the number of nearby dwellings; the effect of the noise limits on energy produced; and the duration and level of exposure.

Table 12.4: Permissible Noise Level Criteria

Time of Day	Permissible Noise Level
Quiet waking hours	35-40dB(A) for L_B less than 30-35 dB(A) L_B + 5 dB, for L_B greater than 30-35dB(A)
Night-time hours	43 dB(A) for L_B less than 38 dB(A) L_B + 5 dB, for L_B greater than 38 dB(A)

12.76 Note that a higher noise level is permissible during night-time hours than during quiet waking hours, as it is assumed that residents would be indoors.

12.77 The wind speeds at which the acoustic impact are considered are less than or equal to 12 m/s at a height of 10 m and are likely to be the acoustically critical wind speeds. Above these wind speeds, as stated in ETSU-R-97, reliable measurements of background and turbine noise are difficult to make. However, if a wind farm meets the noise criteria at wind speeds lower than that presented, it is highly unlikely that it will cause any greater loss of amenity at higher wind speeds due to increasing background noise levels masking wind farm generated noise.

Method for Construction Noise Assessment

12.78 To ensure adequate assessment of the potential impacts of the construction noise from the proposed wind farm the following steps have been taken:

- Baseline noise criteria is established from the appropriate guidance BS 5228-1:2009 'Noise control on construction and open sites' (BSI, 2009)[23] – refer to paragraph 12.109;
- Noise predictions are made at the most critically sensitive properties. Noise due to on-site construction activities are calculated using the BS 5228-1:2009 standard – refer to paragraph 12.110;
- Consideration of the potential noise impact due to construction traffic on the A939 road has been carried out in accordance with the guidance on Noise and Vibration in the "Design Manual for Roads and Bridges" (DMRB, 2011)[28] refer to paragraph 12.112;
- Predictions of noise for construction traffic are made at the most critically sensitive properties near the proposed wind farm development site are calculated using the BS 5228-1:2009 standard – refer to paragraph 12.115; and
- The combined effect of on-site construction activities with construction traffic is compared with the target level specified by BS 5228-1:2009 – refer to paragraph 12.118.

Baseline Conditions

Operational Noise

12.79 The Site is located southeast of the small settlement of Ferness (approximately 1.5 km from the nearest turbine. The surrounding area is predominantly rural in nature and used for grazing sheep and cattle. The general noise character is quiet and typical of a rural environment with noise from farm machinery, sheep, cattle and birds, with the occasional overhead aircraft.

12.80 Background noise measurements were undertaken by RES in accordance with ETSU-R-97 as detailed in Table 12.5. Two measurement campaigns took place at a total of six locations. Measurements were carried out at three locations in 2004 and at three locations in 2013. Measurements were made at these locations as they are the most noise sensitive dwellings, geographically spread around the Site and are likely to be representative of other houses in the locale. Correspondence with THC took place prior to both measurement campaigns.

Table 12.5: Background Noise Survey Details

House Name	Measurement Period			Instrument Type
	Start	End	Duration (days)	
Muckle Lyne	03/06/2004	29/06/2004	27	Rion NL 31
Little Aitnoch	03/06/2004	29/06/2004	27	Rion NL 31
Kerrow Farmhouse	03/06/2004	29/06/2004	27	Rion NL 31
The Old Schoolhouse	17/05/2013	01/08/2013	77	Rion NL 31
Achnabechan Farm	17/05/2013	23/07/2013	68	Rion NL 31
Braemoray Lodge	21/06/2013	01/08/2013	42	Rion NL 31

12.81 The meters were placed in moderately exposed positions, away from reflecting walls and vegetation. Photos of the equipment, in situ, may be seen in **Technical Appendix 12.1**. The apparatus were calibrated before and after the survey period and no significant drift was detected. All instrumentation has been subject to laboratory calibration traceable to national standards within the last 24 months, details are provided in **Technical Appendix 12.2**.

12.82 For the 2013 survey, wind speed and direction were recorded by a LIDAR (Light Detection and Ranging) instrument. LIDAR is a remote sensing device that measures conditions in the atmosphere by using pulses from a LASER by applying the principle of the Doppler Effect, detecting the movement of air in the atmospheric boundary layer to measure wind speed and

[28] DMRB, 2011. "Design Manual for Roads and Bridges - Noise and Vibration", Volume 11, Section 3, Part 7, HD 213/11, Highways Agency, February 2011.

direction. LIDAR provides measurements at several heights, and this enables wind speed data to be obtained that describe the wind profile across a range of heights.

12.83 LIDAR has been successfully tested, by independent third parties using suitable test sites, against conventional anemometry (Albers, 2008)[29] (Gottschall, 2010)[30]. From the technical reports, these tests have demonstrated that, over a range of relevant heights, the accuracy of the LIDAR is comparable to that of the conventional anemometry.

12.84 The results of these validation campaigns provide confidence that LIDAR can reproduce traditional wind speed measurements within the approximate uncertainty limits expected for cup anemometer measurements.

12.85 Due to an issue with the extension cable connecting the microphone with the sound level meter at The Old Schoolhouse data has been excluded up until 26/06/2013 when the cable was replaced.

Data was excluded from 19/06/2004 for the last 11 days of the survey at Kerrow Farmhouse as a conservative measure due to increased levels of background noise attributed to heavy rain and subsequent increased water flow in the nearby river.

Data was excluded for approximately 8 days at Braemoray Lodge due to increased levels of background noise attributed to heavy rain and subsequent increased water flow in the nearby river.

12.86 In **Technical Appendix 12.3** Chart 12.1 shows the measured wind rose at the Site over the 2004 background noise survey period, as measured by the meteorological mast located on the Site.

12.87 In **Technical Appendix 12.3** Chart 12.2 shows the measured wind rose at the Site over the 2013 background noise survey period, as measured by the LiDAR.

12.88 For illustrative purposes, Chart 12.3 shows the measured wind rose over an extended period (16/08/2002 – 13/02/2007) from the meteorological mast located on the Site. As discussed previously, the noise prediction model employed is likely to overestimate the real noise emission levels for locations not downwind of the turbines. Charts 12.1 and 12.2 therefore may aid the reader as to the likelihood of over-estimation due to this factor.

12.89 Chart 12.4 & Chart 12.9 show $L_{A90,\ 10min}$ correlated against wind speed for quiet waking hour periods at each survey location. In each case, a 'best fit' line has been fitted to the data and the suggested noise limits added (see paragraph 12.103).

12.90 Chart 12.10 & Chart 12.15 show $\neg L_{A90,\ 10min}$ correlated against the wind speed for night-time periods at each survey location. In each case, a 'best fit' line has been fitted to the data and the suggested noise limits added (see paragraph 12.103).

12.91 Table 12.6 & Table 12.7 below details the $L_{A90,10min}$ background noise levels calculated from the derived 'best fit' lines, as described above:

Table 12.6: Quiet Waking Hours Noise Levels (dB(A) re 20 µPa)

	Quiet Waking Hours Noise Levels at Indicated Locations Standardised 10 m Wind Speed / ms^{-1}											
House Name	1	2	3	4	5	6	7	8	9	10	11	12
Muckle Lyne	27.3	27.3	27.7	28.5	29.7	31.3	33.1	35.1	37.2	39.3	41.5	41.5
Little Aitnoch	22.2	22.2	23.2	25.0	27.4	30.2	33.0	35.6	37.8	39.3	39.7	39.7
Kerrow Farmhouse	31.5	31.5	31.7	32.5	33.7	35.2	36.8	38.5	40.1	41.5	42.6	42.6
The Old Schoolhouse	25.3	26.0	27.4	29.2	31.5	33.9	36.6	39.2	41.8	44.1	44.1	44.1
Achnabechan Farm	23.3	24.1	25.1	26.2	27.5	29.2	31.2	33.6	36.4	39.8	39.8	39.8
Braemoray Lodge	26.1	26.1	27.4	29.5	32.4	35.6	39.1	42.6	45.8	48.6	48.6	48.6

Table 12.7: Night-time Noise Levels (dB(A) re 20 µPa)

	Night Time Noise Levels at Indicated Locations Standardised 10 m Wind Speed / ms^{-1}											
House Name	1	2	3	4	5	6	7	8	9	10	11	12
Muckle Lyne	24.5	24.5	24.7	25.6	27.0	28.8	30.8	32.8	34.6	36.1	36.1	36.1
Little Aitnoch	21.9	21.9	22.5	23.8	25.7	28.3	31.3	34.8	38.7	42.8	42.8	42.8
Kerrow Farmhouse	28.6	29.2	29.9	30.6	31.4	32.3	33.4	34.6	35.9	37.4	37.4	37.4
The Old Schoolhouse	23.4	23.4	24.3	26.0	28.2	30.6	33.0	35.0	36.5	37.0	37.0	37.0
Achnabechan Farm	20.5	21.3	22.1	22.9	24.0	25.2	26.8	28.7	31.0	33.8	37.2	37.2
Braemoray Lodge	25.8	25.8	26.5	27.9	29.9	32.2	34.8	37.4	39.9	42.1	43.9	43.9

Construction Noise

12.92 For the on-site construction noise assessment Annex E of BS 5228-1:2009 "Code of practice for noise and vibration control on construction and open sites" Part 1 – Noise (BSI, 2009)[23] provides guidance on setting environmental noise targets. Several methods of assessing the significance of noise levels are presented in Annex E and the most applicable to the construction of the proposed wind farm development is the ABC method.

The ABC method sets threshold noise levels for specific periods. Due to the relatively low levels of ambient noise at the Site a category A assessment has been chosen. This category sets a maximum L_{Aeq} criteria of: 65 dB(A) during weekdays (0700-1900) and Saturdays (0700-1300); below 55 dB(A) at evenings and weekends; and below 45 dB(A) for night-time (2300 0700).

[29] Albers et al., 2008. "Evaluation of WINDCUBE", Deutsche WindGuard Consulting GmbH, Report PP 08007, 16 March 2008

[30] Gottschall et al., 2010. "Verification test for three WindCubeTM WLS7 LiDARs at the Høvsøre test site", DTU Report Risø-R-1732, May 2010

Potential Impacts

Potential Operational Impacts

Noise Propagation Modelling

12.93 The locations of the proposed turbines are provided in Table 12.8 and are shown in Figure 12.1 in the figures section of the ES.

Table 12.8: Location of Proposed Turbines

Turbine	OSGB Co-ordinates		Elevation / m
	X / m	Y / m	
T1	297678	841676	274
T2	298265	841766	273
T3	297269	841999	273
T4	297985	841995	288
T5	297667	842174	283
T6	298367	842217	279
T7	297391	842406	275
T8	298062	842430	303
T9	297153	842677	262
T10	297721	842711	286
T11	298446	842720	267
T12	297484	842982	267
T13	298120	842888	281
T14	297168	843220	247
T15	297875	843139	272
T16	298299	843259	251
T17	297566	843389	256
T18	297966	843551	252
T19	297535	843786	241
T20	297937	843941	238

12.94 The locations of the nearest neighbours to the turbines have been determined by inspection of background mapping, aerial photography and through site visits. More properties may have been identified but have not been considered critical to this acoustic assessment or may be adequately represented by another property. The locations considered are listed in Table 12.9 and are also shown in Figure 12.1. Elevations, given in metres above mean sea level, have been determined from digital terrain data. Properties identified as non-residential are not considered further.

12.95 The distances from the approximate centre point of each house to the nearest turbine are given in Table 12.9. It can be seen that the minimum house-to-turbine separation is 1165 m.

Table 12.9: Location of Nearby Neighbours & Distances to Nearest Proposed Turbine

House ID	House Name	OSGB Co-ordinates		Elevation / m	Distance / m	Nearest Turbine	Description
		X / m	Y / m				
H1	Aitnoch Farmhouse	298159	839664	283	2069	T1	Occupied
H2	Little Aitnoch	296891	840817	276	1165	T1	Occupied
H3	Kerrow Farmhouse	299625	841891	231	1300	T6	Occupied
H4	Braemoray Lodge	299789	842834	228	1348	T11	Occupied
H5*	The White House*	300059	843252	248	1698	T11	Unoccupied
H6	1 Drumore Cottages	295442	843576	204	1762	T14	Occupied
H7	3 Drumore Cottages	295443	843615	206	1770	T14	Occupied
H8	2 Drumore Cottages	295448	843632	206	1769	T14	Occupied
H9	Glenferness Mains	294960	843656	195	2251	T14	Occupied
H10	Achnabechan Farm	295788	843732	207	1472	T14	Occupied
H11	Culfearn	300008	843810	225	1796	T16	Occupied
H12	Tombain	300613	844376	233	2569	T16	Occupied
H13	Factors Cottage	295764	844470	184	1880	T14	Occupied
H14	Tomnarroch	296158	844552	191	1576	T19	Occupied
H15	Tomdow	300493	844646	220	2596	T16	Occupied
H16	Tomdow Cottage	300526	844681	219	2642	T16	Occupied
H17	Leonach Cottage	296232	844817	191	1662	T19	Occupied
H18	6 Glenferness	296240	844835	191	1667	T19	Occupied
H19	Birch Cottage	296250	844855	192	1672	T19	Occupied
H20	Sturrock	296261	844881	191	1680	T19	Occupied
H21	Smiddy House	296260	844907	190	1698	T19	Occupied
H22	Rose Cottage	296272	844916	191	1695	T19	Occupied
H23	The Old Post Office House	296281	844939	192	1704	T19	Occupied
H24	Bungalow	296312	844990	193	1716	T19	Occupied
H25	New Inn	296376	845076	195	1734	T19	Occupied
H26	Glebe Cottage	295583	845277	163	2456	T19	Occupied
H27	Roundwood House	295583	845277	163	2456	T19	Occupied
H28	Muckle Lyne	297924	845289	202	1348	T20	Occupied
H29	Little Lyne	297390	845305	192	1470	T20	Occupied
H30	Head Foresters House	296355	845369	177	1974	T19	Occupied
H32	1 Forestry Houses	296449	845627	171	2137	T19	Occupied
H33	2 Forestry Houses	296459	845638	171	2142	T19	Occupied
H34	3 Forestry Houses	296468	845648	171	2146	T19	Occupied

Table 12.9: Location of Nearby Neighbours & Distances to Nearest Proposed Turbine

House ID	House Name	OSGB Co-ordinates		Elevation / m	Distance / m	Nearest Turbine	Description
		X / m	Y / m				
H35	4 Forestry Houses	296474	845657	171	2151	T19	Occupied
H36	5-6 Forestry Houses	296488	845662	171	2148	T19	Occupied
H37	The Mount	297902	845725	191	1784	T20	Occupied
H38	Score Farm	297275	845877	194	2046	T20	Occupied
H39	Airdrie Mill	297564	845882	177	1977	T20	Occupied
H40	Logie Farm	296931	846534	132	2781	T20	Occupied
H41	Logie Farm Riding Centre	296947	846555	131	2795	T20	Occupied
H42	Airdrie Farm	297990	846929	184	2988	T20	Occupied
H46^	Property A^	295665	843879	196	1641	T14	Occupied
H47	The Lodge	295166	843037	210	2010	T14	Occupied
H48	The Old Schoolhouse	296296	844955	192	1703	T19	Occupied
H49	Village Hall	296406	845147	195	1769	T19	Non-residential
H50	Wester Tilliglens	300433	846102	189	3302	T20	Occupied
H51	Wester Glenernie	300860	845679	190	3401	T20	Occupied
H52	Refouble	295199	839996	260	2880	T3	Occupied
H53	Milltown	294502	841260	212	2864	T3	Occupied
H54	Ballindore	294642	841998	213	2601	T9	Occupied
H55	Kennels	294145	842516	209	3012	T9	Occupied
H56	Ardclach Old Parish Church	295483	845019	124	2394	T19	Non-residential

* The White House (H5) is currently unoccupied but has been considered in this assessment as it may become occupied

^ No address data was available for Property A (H46)

12.96 Although not finalised, the turbine type for the Proposed Wind Farm Development is likely to be acoustically similar to the Vestas V90 3MW machine. This chapter uses the acoustic data from the manufacturer's general specification from this machine for all analysis (Vestas, 2011)[31]. The manufacturer has identified these values as warranted and 1dB has been added to the warranted turbine noise levels to allow for a test measurement uncertainty. Details assumed in this analysis are as follows:

- a hub height of 65 m;
- a rotor diameter of 90 m;
- sound power levels, L_{WA}, for standardised 10 m height wind speeds (v_{10}) as shown in Table 12.10;
- 1/1 octave band spectra, standardised 10 m height wind speeds (v_{10}), as shown in Table 12.11;
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

Table 12.10: Warranted Sound Power Levels for the Vestas V90 3MW Wind Turbine +1dB for test measurement uncertainty

Standardised 10m Height Wind Speed, v_{10} / ms^{-1}	A-Weighted Sound Power Level / dB(A) re 1 pW	A-Weighted Sound Power Level including +1 dB uncertainty
4	97.9	98.9
5	100.9	101.9
6	104.2	105.2
7	106.1	107.1
8	107.0	108.0
9	106.9	107.9
10	105.6	106.6
11	105.2	106.2
12	105.3	106.3

Table 12.11: Octave Band Sound Power Level Spectra for the Vestas V90 3MW Wind Turbine

Octave Band / Hz	A-Weighted Sound Power Level at 10m standardised wind speeds / dB(A) re 1 pW						
	4ms^{-1}	5ms^{-1}	6ms^{-1}	7ms^{-1}	8ms^{-1}	9ms^{-1}	10ms^{-1}
63	78.4	83.1	86.8	91.2	93.2	93.7	92.5
125	86.5	88.1	91.9	94.2	95.3	95.2	93.9
250	90.5	92.6	94.8	96.8	97.9	97.6	96.2
500	92.3	94.6	97.4	99.2	100.2	100.2	98.9
1000	93.0	96.6	100.2	101.9	102.7	102.6	101.1
2000	92.0	95.5	99.3	101.1	101.9	101.9	100.7
4000	88.8	92.2	95.4	97.2	98.1	97.8	96.3
8000	79.0	81.6	84.8	86.7	87.7	87.8	86.6
OVERALL	98.9	101.9	105.2	107.1	108.0	107.9	106.6

Predictions of Noise Levels at Receivers

12.97 Table 12.12 shows the predicted noise immission levels at the nearest neighbours at each wind speed considered, calculated from the operation of the Proposed Wind Farm Development. The property with the highest predicted noise immission level is Little Aitnoch at 38.2 dB(A) and is highlighted in bold.

[31] Vestas, 2011. "General Specification V90-3.0MW VCS 50 Hz", Document ID: 0000-5450 Revision 07, 2011-10-18

12.98 Figure 12.1 shows an isobel (i.e. noise contour) plot for the Site at a 10 m height wind speed of 8 ms^{-1}. Such plots are useful for evaluating the noise 'footprint' of a given development.

Table 12.12: Predicted Noise Levels At Nearby Dwellings (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (Standardised v_{10}) / ms^{-1}								
		4	5	6	7	8	9	10	11	12
H1	Aitnoch Farmhouse	24.4	27.0	30.0	32.3	33.6	33.6	32.3	31.9	32.0
H2	Little Aitnoch	**29.2**	**31.9**	**35.0**	**37.1**	**38.2**	**38.2**	**36.9**	**36.5**	**36.6**
H3	Kerrow Farmhouse	29.0	31.7	34.8	36.9	38.0	38.0	36.7	36.3	36.4
H4	Braemoray Lodge	28.7	31.3	34.4	36.6	37.7	37.7	36.4	36.0	36.1
H5	The White House	28.5	31.1	34.2	36.4	37.6	37.6	36.2	35.8	35.9
H6	1 Drumore Cottages	26.1	28.7	31.8	34.0	35.2	35.2	33.9	33.5	33.6
H7	3 Drumore Cottages	26.1	28.7	31.7	34.0	35.2	35.2	33.9	33.5	33.6
H8	2 Drumore Cottages	26.1	28.7	31.7	34.0	35.2	35.2	33.9	33.5	33.6
H9	Glenferness Mains	23.9	26.5	29.5	31.8	33.0	33.1	31.8	31.4	31.5
H10	Achanabechan Farm	27.6	30.2	33.2	35.4	36.5	36.5	35.2	34.8	34.9
H11	Culfearn	26.8	29.4	32.4	34.7	35.9	35.9	34.6	34.2	34.3
H12	Tombain	24.3	26.9	29.9	32.3	33.6	33.6	32.3	31.9	32.0
H13	Factors Cottage	25.6	28.2	31.3	33.5	34.7	34.8	33.4	33.0	33.1
H14	Tomnarroch	26.7	29.3	32.3	34.5	35.7	35.7	34.3	33.9	34.0
H15	Tomdow	24.1	26.6	29.7	32.1	33.3	33.4	32.1	31.7	31.8
H16	Tomdow Cottage	23.9	26.4	29.5	31.9	33.2	33.2	31.9	31.5	31.6
H17	Leonach Cottage	25.6	28.2	31.2	33.4	34.5	34.5	33.2	32.8	32.9
H18	6 Glenferness	25.5	28.1	31.2	33.3	34.5	34.5	33.2	32.8	32.9
H19	Birch Cottage	25.4	27.9	31.0	33.1	34.3	34.3	33.0	32.6	32.7
H20	Sturrock	24.7	27.3	30.3	32.5	33.7	33.7	32.4	32.0	32.1
H21	Smiddy House	24.5	27.1	30.1	32.3	33.4	33.5	32.1	31.7	31.8
H22	Rose Cottage	24.5	27.1	30.1	32.3	33.4	33.5	32.1	31.7	31.8
H23	The Old Post Office House	24.3	26.9	29.9	32.1	33.2	33.3	31.9	31.5	31.6
H24	Bungalow	24.0	26.6	29.6	31.8	33.0	33.0	31.7	31.3	31.4
H25	New Inn	23.5	26.1	29.1	31.3	32.5	32.5	31.2	30.8	30.9
H26	Glebe Cottage	22.8	25.3	28.3	30.7	32.0	32.0	30.7	30.3	30.4
H27	Roundwood House	22.8	25.3	28.3	30.7	32.0	32.0	30.7	30.3	30.4
H28	Muckle Lyne	27.2	29.8	32.8	35.0	36.1	36.1	34.8	34.4	34.5
H29	Little Lyne	26.9	29.5	32.5	34.7	35.9	35.9	34.6	34.2	34.3
H30	Head Foresters House	22.3	24.9	27.9	30.1	31.3	31.3	30.0	29.6	29.7
H32	1 Forestry Houses	21.5	24.1	27.1	29.4	30.6	30.6	29.3	28.9	29.0
H33	2 Forestry Houses	21.5	24.1	27.1	29.3	30.6	30.6	29.3	28.9	29.0
H34	3 Forestry Houses	21.5	24.0	27.0	29.3	30.5	30.6	29.2	28.8	28.9
H35	4 Forestry Houses	21.5	24.0	27.0	29.3	30.5	30.5	29.2	28.8	28.9
H36	5-6 Forestry Houses	21.5	24.0	27.0	29.3	30.5	30.6	29.2	28.8	28.9
H37	The Mount	24.8	27.4	30.5	32.8	34.0	34.0	32.7	32.3	32.4
H38	Score Farm	23.9	26.5	29.5	31.9	33.1	33.1	31.8	31.4	31.5
H39	Airdrie Mill	24.0	26.5	29.6	31.8	33.0	33.0	31.7	31.3	31.4
H40	Logie Farm	18.9	21.4	24.4	26.8	28.1	28.1	26.8	26.4	26.5
H41	Logie Farm Riding Centre	18.8	21.3	24.3	26.7	28.0	28.1	26.8	26.4	26.5
H42	Airdrie Farm	20.1	22.6	25.7	28.2	29.5	29.6	28.3	27.9	28.0
H46	Property A	26.7	29.3	32.3	34.5	35.7	35.7	34.4	34.0	34.1
H47	The Lodge	25.3	27.9	30.9	33.2	34.4	34.5	33.1	32.7	32.8
H48	The Old Schoolhouse	24.3	26.8	29.9	32.1	33.2	33.2	31.9	31.5	31.6
H50	Wester Tillieglens	19.5	22.0	25.0	27.6	28.9	29.0	27.7	27.3	27.4
H51	Wester Glenfernie	20.0	22.6	25.6	28.2	29.6	29.7	28.4	28.0	28.1
H52	Refouble	21.0	23.5	26.5	28.9	30.1	30.2	28.9	28.5	28.6
H53	Milltown	20.8	23.3	26.3	28.7	30.0	30.0	28.7	28.3	28.4
H54	Ballindore	22.8	25.3	28.4	30.7	32.0	32.0	30.7	30.3	30.4
H55	Kennels	21.5	24.0	27.0	29.4	30.7	30.7	29.4	29.0	29.1

Values in bold indicate the maximum predicted noise level
Shading indicates properties with predicted noise levels greater than 35 dB(A), refer to paragraph 12.99

12.99 Noise levels at 37 of the 50 nearest occupied neighbours are below 35 dB(A) level, indicating that the noise emission levels would be regarded as acceptable and the householders' amenities as receiving 'sufficient protection' without further assessment requiring to be undertaken (refer to paragraph 12.74).

12.100 There are 13 properties that do not pass this simplified noise criteria assessment as indicated in Table 12.12. Therefore the 'full' acoustic assessment has only been considered at those properties. However, as a background noise survey was carried out at The Old Schoolhouse, this property has also been considered in the full acoustic assessment so as to provide a more comprehensive description of the acoustic impact of the Proposed Wind Farm Development.

Acoustic Acceptance Criteria

12.101 As described in paragraph 12.75, during quiet waking hours and at low background noise levels, a permissible noise level of 35 - 40 dB(A) should be used. The exact value is

dependent upon a number of factors: the number of nearby dwellings, the effect of the noise limits on energy produced and the duration and level of exposure. In accordance with THC noise guidance[32], RES have adopted a lower limit of 35 dB(A) during quiet waking hours. Also in accordance with THC noise guidance, a 38 dB(A) lower limit has been adopted for night-time, this is not in accordance with ETSU-R-97 but has been adopted in this assessment as a conservative measure.

Table 12.13: Permissible Noise Level Criteria in Vicinity of Cairn Duhie Wind Farm

Time of Day	Permissible Noise Level
Quiet waking hours	35 dB(A) for L_B less than 30 dB(A) LB + 5 dB, for L_B greater than 30 dB(A)
Night-time hours	38 dB(A) for L_B less than 33 dB(A) L_B + 5 dB, for L_B greater than 33 dB(A)

12.102 Note that a higher noise level is permissible during night-time hours than during quiet waking hours, as it is assumed that residents would be indoors.

Calculation of Acceptable Noise Limits from Baseline Conditions

12.103 The 'best-fit' lines of Chart 12.4 - Chart 12.15 have been used to deduce the acceptable noise limits at the background noise measurement locations and other locations with cumulative predicted noise levels above 35dB(A). Table 12.14 shows the suggested quiet waking hours noise limits and Table 12.15 the suggested night-time noise limits.

Table 12.14: Recommended Quiet Waking Hours Noise Limits (dB(A) re 20 µPa)

House Name	Quiet Waking Hours Noise Limits at Indicated Locations Standardised 10 m Wind Speed / ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
Muckle Lyne	35.0	35.0	35.0	35.0	35.0	36.3	38.1	40.1	42.2	44.3	46.5	46.5
Little Aitnoch	35.0	35.0	35.0	35.0	35.0	35.2	38.0	40.6	42.8	44.3	44.7	44.7
Kerrow Farmhouse	36.5	36.5	36.7	37.5	38.7	40.2	41.8	43.5	45.1	46.5	47.6	47.6
The Old Schoolhouse	35.0	35.0	35.0	35.0	36.5	38.9	41.6	44.2	46.8	49.1	49.1	49.1
Achnabechan Farm	35.0	35.0	35.0	35.0	35.0	35.0	36.2	38.6	41.4	44.8	44.8	44.8
Braemoray Lodge	35.0	35.0	35.0	35.0	37.4	40.6	44.1	47.6	50.8	53.6	53.6	53.6

Table 12.15: Recommended Night-time Noise Limits (dB(A) re 20 µPa)

House Name	Night-time Noise Limits at Indicated Locations Standardised 10 m Wind Speed / ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
Muckle Lyne	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	39.6	41.1	41.1	41.1
Little Aitnoch	38.0	38.0	38.0	38.0	38.0	38.0	38.0	39.8	43.7	47.8	47.8	47.8
Kerrow Farmhouse	38.0	38.0	38.0	38.0	38.0	38.0	38.4	39.6	40.9	42.4	42.4	42.4
The Old Schoolhouse	38.0	38.0	38.0	38.0	38.0	38.0	38.0	40.0	41.5	42.0	42.0	42.0
Achnabechan Farm	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.8	42.2	42.2
Braemoray Lodge	38.0	38.0	38.0	38.0	38.0	38.0	39.8	42.4	44.9	47.1	48.9	48.9

12.104 The recommendations of ETSU-R-97 state that where there are groups of properties that are likely to have a similar background noise environment, it is appropriate to use data from one representative location as the basis for assessment at the other properties. The survey results inferred to be representative for each property is shown in Table 12.16. Although some properties to the east are more proximate to Braemoray Lodge, Kerrow is seen as a more representative location.

Table 12.16: Assumed Representative Background Noise Survey Locations

House ID	House Name	Assumed Representative Background Noise Survey
H1	Aitnoch Farmhouse	Little Aitnoch
H2	Little Aitnoch	Little Aitnoch
H3	Kerrow Farmhouse	Kerrow
H4	Braemoray Lodge	Braemoray Lodge
H5	The White House	Kerrow
H6	1 Drumore Cottages	Achnabechan Farm
H7	3 Drumore Cottages	Achnabechan Farm
H8	2 Drumore Cottages	Achnabechan Farm
H9	Glenferness Mains	Achnabechan Farm
H10	Achanabechan Farm	Achnabechan Farm
H11	Culfearn	Kerrow
H12	Tombain	Kerrow
H13	Factors Cottage	Achnabechan Farm
H14	Tomnarroch	The Old Schoolhouse
H15	Tomdow	Kerrow
H16	Tomdow Cottage	Kerrow
H17	Leonach Cottage	The Old Schoolhouse

[32] The Highland Council, "Noise Assessment Guidance For Wind Farms" 07/05/2013

Table 12.16: Assumed Representative Background Noise Survey Locations

House ID	House Name	Assumed Representative Background Noise Survey
H18	6 Glenferness	The Old Schoolhouse
H19	Birch Cottage	The Old Schoolhouse
H20	Sturrock	The Old Schoolhouse
H21	Smiddy House	The Old Schoolhouse
H22	Rose Cottage	The Old Schoolhouse
H23	The Old Post Office House	The Old Schoolhouse
H24	Bungalow	The Old Schoolhouse
H25	New Inn	The Old Schoolhouse
H26	Glebe Cottage	The Old Schoolhouse
H27	Roundwood House	The Old Schoolhouse
H28	Muckle Lyne	Muckle Lyne
H29	Little Lyne	Muckle Lyne
H30	Head Foresters House	The Old Schoolhouse
H32	1 Forestry Houses	The Old Schoolhouse
H33	2 Forestry Houses	The Old Schoolhouse
H34	3 Forestry Houses	The Old Schoolhouse
H35	4 Forestry Houses	The Old Schoolhouse
H36	5-6 Forestry Houses	The Old Schoolhouse
H37	The Mount	Muckle Lyne
H38	Score Farm	Muckle Lyne
H39	Airdrie Mill	Muckle Lyne
H40	Logie Farm	Muckle Lyne
H41	Logie Farm Riding Centre	Muckle Lyne
H42	Airdrie Farm	Muckle Lyne
H46	Property A	Achnabechan Farm
H47	The Lodge	Achnabechan Farm
H48	The Old Schoolhouse	The Old Schoolhouse
H50	Wester Tillieglens	Muckle Lyne
H51	Wester Glenfernie	Kerrow
H52	Refouble	Little Aitnoch
H53	Milltown	Achnabechan Farm
H54	Ballindore	Achnabechan Farm
H55	Kennels	Achnabechan Farm

Acoustic Assessment

12.105 Table 12.17 shows a comparison of the predicted noise levels with the recommended quiet waking hours noise limits for each house where the full assessment procedure is being applied. The predicted noise levels at 1 ms^{-1}, 2 ms^{-1} and 3 ms^{-1} have been assumed as equal to 4 ms^{-1}, though this is a conservative measure. The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit. A negative value indicates that the predicted noise level is within the limit. Table 12.18 shows a comparison with the recommended night-time noise limits.

12.106 Noise levels at all locations are within both the quiet waking hours limit and night-time noise limits, at all wind speeds considered. The minimum margin of predicted noise levels below derived noise limits, for all wind speeds considered, during quiet waking hours, is -0.2 dB(A). Similarly the minimum margin during night-time periods, for all wind speeds considered, is -0.9 dB(A). These are highlighted in Table 12.17 & Table 12.18.

Table 12.17: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits - (dB(A) re 20 μPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	29.2	35.0	-5.8	29.2	35.0	-5.8	29.2	35.0	-5.8	29.2	35.0	-5.8
H3	Kerrow Farmhouse	29.0	36.5	-7.5	29.0	36.5	-7.5	29.0	36.7	-7.7	29.0	37.5	-8.5
H4	Braemoray Lodge	28.7	35.0	-6.3	28.7	35.0	-6.3	28.7	35.0	-6.3	28.7	35.0	-6.3
H5	The White House	28.5	36.5	-6.5	28.5	36.5	-6.5	28.5	36.7	-6.5	28.5	37.5	-6.5
H6	1 Drumore Cottages	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9
H7	3 Drumore Cottages	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9
H8	2 Drumore Cottages	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9
H10	Achnabechan Farm	27.6	35.0	-7.4	27.6	35.0	-7.4	27.6	35.0	-7.4	27.6	35.0	-7.4
H11	Culfearn	26.8	36.5	-8.2	26.8	36.5	-8.2	26.8	36.7	-8.2	26.8	37.5	-8.2
H14	Tomnarroch	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3
H26	Muckle Lyne	27.2	35.0	-7.8	27.2	35.0	-7.8	27.2	35.0	-7.8	27.2	35.0	-7.8
H29	Little Lyne	26.9	35.0	-8.1	26.9	35.0	-8.1	26.9	35.0	-8.1	26.9	35.0	-8.1
H46	Property A	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3
H48	The Old Schoolhouse	24.3	35.0	-10.7	24.3	35.0	-10.7	24.3	35.0	-10.7	24.3	35.0	-10.7
		Reference Wind Speed (v_{10}) / ms^{-1}											
		5			6			7			8		
House ID	House Name	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	31.9	35.0	-3.1	35.0	35.2	-0.2	37.1	38.0	-0.9	38.2	40.6	-2.4
H3	Kerrow Farmhouse	31.7	38.7	-7.0	34.8	40.2	-5.4	36.9	41.8	-4.9	38.0	43.5	-5.5
H4	Braemoray Lodge	31.3	37.4	-6.1	34.4	40.6	-6.2	36.6	44.1	-7.5	37.7	47.6	-9.9
H5	The White House	31.1	38.7	-6.3	34.2	40.2	-6.4	36.4	41.8	-7.7	37.6	43.5	-10.0
H6	1 Drumore Cottages	28.7	35.0	-6.3	31.8	35.0	-3.2	34.0	36.2	-2.2	35.2	38.6	-3.4
H7	3 Drumore Cottages	28.7	35.0	-6.3	31.7	35.0	-3.3	34.0	36.2	-2.2	35.2	38.6	-3.4
H8	2 Drumore Cottages	28.7	35.0	-6.3	31.7	35.0	-3.3	34.0	36.2	-2.2	35.2	38.6	-3.4
H10	Achnabechan Farm	30.2	35.0	-4.8	33.2	35.0	-1.8	35.4	36.2	-0.8	36.5	38.6	-2.1
H11	Culfearn	29.4	38.7	-8.0	32.4	40.2	-8.2	34.7	41.8	-9.4	35.9	43.5	-11.7
H14	Tomnarroch	29.3	36.5	-7.2	32.3	38.9	-6.6	34.5	41.6	-7.1	35.7	44.2	-8.5
H26	Muckle Lyne	29.8	35.0	-5.2	32.8	36.3	-3.5	35.0	38.1	-3.1	36.1	40.1	-4.0
H29	Little Lyne	29.5	35.0	-5.5	32.5	36.3	-3.8	34.7	38.1	-3.4	35.9	40.1	-4.2
H46	Property A	29.3	35.0	-5.7	32.3	35.0	-2.7	34.5	36.2	-1.7	35.7	38.6	-2.9
H48	The Old Schoolhouse	26.8	36.5	-9.7	29.9	38.9	-9.0	32.1	41.6	-9.5	33.2	44.2	-11.0

Table 12.17: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		9			10			11			12		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	38.2	42.8	-4.6	36.9	44.3	-7.4	36.5	44.7	-8.2	36.6	44.7	-8.1
H3	Kerrow Farmhouse	38.0	45.1	-7.1	36.7	46.5	-9.8	36.3	47.6	-11.3	36.4	47.6	-11.2
H4	Braemoray Lodge	37.7	50.8	-13.1	36.4	53.6	-17.2	36.0	53.6	-17.6	36.1	53.6	-17.5
H5	The White House	37.6	45.1	-13.2	36.2	46.5	-17.4	35.8	47.6	-17.8	35.9	47.6	-17.7
H6	1 Drumore Cottages	35.2	41.4	-6.2	33.9	44.8	-10.9	33.5	44.8	-11.3	33.6	44.8	-11.2
H7	3 Drumore Cottages	35.2	41.4	-6.2	33.9	44.8	-10.9	33.5	44.8	-11.3	33.6	44.8	-11.2
H8	2 Drumore Cottages	35.2	41.4	-6.2	33.9	44.8	-10.9	33.5	44.8	-11.3	33.6	44.8	-11.2
H10	Achnabechan Farm	36.5	41.4	-4.9	35.2	44.8	-9.6	34.8	44.8	-10.0	34.9	44.8	-9.9
H11	Culfearn	35.9	45.1	-14.9	34.6	46.5	-19.0	34.2	47.6	-19.4	34.3	47.6	-19.3
H14	Tomnarroch	35.7	46.8	-11.1	34.3	49.1	-14.8	33.9	49.1	-15.2	34.0	49.1	-15.1
H26	Muckle Lyne	36.1	42.2	-6.1	34.8	44.3	-9.5	34.4	46.5	-12.1	34.5	46.5	-12.0
H29	Little Lyne	35.9	42.2	-6.3	34.6	44.3	-9.7	34.2	46.5	-12.3	34.3	46.5	-12.2
H46	Property A	35.7	41.4	-5.7	34.4	44.8	-10.4	34.0	44.8	-10.8	34.1	44.8	-10.7
H48	The Old Schoolhouse	33.2	46.8	-13.6	31.9	49.1	-17.2	31.5	49.1	-17.6	31.6	49.1	-17.5

The term L_p is used to denote the predicted noise level due to the operation of the proposed wind farm
The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit
The shaded value denotes the maximum quiet waking hours ΔL value

Table 12.18: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8
H3	Kerrow Farmhouse	29.0	38.0	-9.0	29.0	38.0	-9.0	29.0	38.0	-9.0	29.0	38.0	-9.0
H4	Braemoray Lodge	28.7	38.0	-9.3	28.7	38.0	-9.3	28.7	38.0	-9.3	28.7	38.0	-9.3
H5	The White House	28.5	38.0	-9.5	28.5	38.0	-9.5	28.5	38.0	-9.5	28.5	38.0	-9.5
H6	1 Drumore Cottages	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9
H7	3 Drumore Cottages	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9
H8	2 Drumore Cottages	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9
H10	Achanabechan Farm	27.6	38.0	-10.4	27.6	38.0	-10.4	27.6	38.0	-10.4	27.6	38.0	-10.4
H11	Culfearn	26.8	38.0	-11.2	26.8	38.0	-11.2	26.8	38.0	-11.2	26.8	38.0	-11.2
H14	Tomnarroch	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3
H26	Muckle Lyne	27.2	38.0	-10.8	27.2	38.0	-10.8	27.2	38.0	-10.8	27.2	38.0	-10.8
H29	Little Lyne	26.9	38.0	-11.1	26.9	38.0	-11.1	26.9	38.0	-11.1	26.9	38.0	-11.1
H46	Property A	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3
H48	The Old Schoolhouse	24.3	38.0	-13.7	24.3	38.0	-13.7	24.3	38.0	-13.7	24.3	38.0	-13.7
		Reference Wind Speed (v_{10}) / ms^{-1}											
		5			6			7			8		
House ID	House Name	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	31.9	38.0	-6.1	35.0	38.0	-3.0	37.1	38.0	-0.9	38.2	39.8	-1.6
H3	Kerrow Farmhouse	31.7	38.0	-6.3	34.8	38.0	-3.2	36.9	38.4	-1.5	38.0	39.6	-1.6
H4	Braemoray Lodge	31.3	38.0	-6.7	34.4	38.0	-3.6	36.6	39.8	-3.2	37.7	42.4	-4.7
H5	The White House	31.1	38.0	-6.9	34.2	38.0	-3.8	36.4	38.4	-3.4	37.6	39.6	-4.8
H6	1 Drumore Cottages	28.7	38.0	-9.3	31.8	38.0	-6.2	34.0	38.0	-4.0	35.2	38.0	-2.8
H7	3 Drumore Cottages	28.7	38.0	-9.3	31.7	38.0	-6.3	34.0	38.0	-4.0	35.2	38.0	-2.8
H8	2 Drumore Cottages	28.7	38.0	-9.3	31.7	38.0	-6.3	34.0	38.0	-4.0	35.2	38.0	-2.8
H10	Achanabechan Farm	30.2	38.0	-7.8	33.2	38.0	-4.8	35.4	38.0	-2.6	36.5	38.0	-1.5
H11	Culfearn	29.4	38.0	-8.6	32.4	38.0	-5.6	34.7	38.4	-5.1	35.9	39.6	-6.5
H14	Tomnarroch	29.3	38.0	-8.7	32.3	38.0	-5.7	34.5	38.0	-3.5	35.7	40.0	-4.3
H26	Muckle Lyne	29.8	38.0	-8.2	32.8	38.0	-5.2	35.0	38.0	-3.0	36.1	38.0	-1.9
H29	Little Lyne	29.5	38.0	-8.5	32.5	38.0	-5.5	34.7	38.0	-3.3	35.9	38.0	-2.1
H46	Property A	29.3	38.0	-8.7	32.3	38.0	-5.7	34.5	38.0	-3.5	35.7	38.0	-2.3
H48	The Old Schoolhouse	26.8	38.0	-11.2	29.9	38.0	-8.1	32.1	38.0	-5.9	33.2	40.0	-6.8

Table 12.18: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		9			10			11			12		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	38.2	43.7	-5.5	36.9	47.8	-10.9	36.5	47.8	-11.3	36.6	47.8	-11.2
H3	Kerrow Farmhouse	38.0	40.9	-2.9	36.7	42.4	-5.7	36.3	42.4	-6.1	36.4	42.4	-6.0
H4	Braemoray Lodge	37.7	44.9	-7.2	36.4	47.1	-10.7	36.0	48.9	-12.9	36.1	48.9	-12.8
H5	The White House	37.6	40.9	-7.3	36.2	42.4	-10.9	35.8	42.4	-13.1	35.9	42.4	-13.0
H6	1 Drumore Cottages	35.2	38.0	-2.8	33.9	38.8	-4.9	33.5	42.2	-8.7	33.6	42.2	-8.6
H7	3 Drumore Cottages	35.2	38.0	-2.8	33.9	38.8	-4.9	33.5	42.2	-8.7	33.6	42.2	-8.6
H8	2 Drumore Cottages	35.2	38.0	-2.8	33.9	38.8	-4.9	33.5	42.2	-8.7	33.6	42.2	-8.6
H10	Achanabechan Farm	36.5	38.0	-1.5	35.2	38.8	-3.6	34.8	42.2	-7.4	34.9	42.2	-7.3
H11	Culfearn	35.9	40.9	-9.0	34.6	42.4	-12.5	34.2	42.4	-14.7	34.3	42.4	-14.6
H14	Tomnarroch	35.7	41.5	-5.8	34.3	42.0	-7.7	33.9	42.0	-8.1	34.0	42.0	-8.0
H26	Muckle Lyne	36.1	39.6	-3.5	34.8	41.1	-6.3	34.4	41.1	-6.7	34.5	41.1	-6.6
H29	Little Lyne	35.9	39.6	-3.7	34.6	41.1	-6.5	34.2	41.1	-6.9	34.3	41.1	-6.8
H46	Property A	35.7	38.0	-2.3	34.4	38.8	-4.4	34.0	42.2	-8.2	34.1	42.2	-8.1
H48	The Old Schoolhouse	33.2	41.5	-8.3	31.9	42.0	-10.1	31.5	42.0	-10.5	31.6	42.0	-10.4

The term L_p is used to denote the predicted noise level due to the operation of the proposed wind farm
The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit
The shaded value denotes the maximum quiet Night-time ΔL value

Potential Construction Impacts

Construction Noise Assessments

12.107 Primary construction activities for which noise arises during the construction period are from: the construction of site tracks; the construction of the temporary construction compound; the construction of the sub-station; the excavation of trenches for cables; the construction of associated hard standings; and excavation and construction of turbine foundations. Noise from vehicles on local roads and access tracks will also arise due to the delivery of turbine components and construction materials, notably aggregates, concrete and steel reinforcement.

12.108 It should be noted that the exact methodology and timing of construction activities cannot be predicted at this time, this assessment is therefore based on assumptions representing a worst-case approach.

Construction Noise Predictions

12.109 The plant assumed for each construction activity is shown in Table 12.19. The number of items indicates how many of each plant could be operating simultaneously for the specified activity, and the duration of activity is a percentage of a given 12 hour day period needed for that plant to operate. Overall sound power levels are based upon the data in Annex C of BS 5228-1:2009.

Table 12.19: Construction Phases and Sound Power Levels

Activities	Plant	Sound Power (L_{WA})	No. Items	Activity Duration (%)	Effective Sound Power (L_{WA})
Construct temporary construction compound	Tracked excavator	113	2	100	119
	Dump truck	113	2	100	
	Tipper lorry	107	2	50	
	Vibratory roller	102	1	75	
	Lorry	108	1	75	
Construct site tracks	Tracked excavator	113	3	100	122
	Dump truck	113	2	75	
	Tipper lorry	107	4	50	
	Dozer	109	1	100	
	Vibratory roller	102	1	75	
	Excavator mounted rock breaker	121	1	50	
Construct Sub-Station	Tracked excavator	113	1	100	115
	Poker vibrator	106	1	50	
	Concrete mixer truck	108	2	50	
	Lorry	108	1	50	
	Telescopic Handler	99	1	100	
Construct crane hardstandings	Tracked excavator	113	3	100	120
	Dump truck	113	2	100	
	Tipper lorry	107	4	50	
	Vibratory roller	102	1	50	
Construct turbine foundations	Tracked excavator	113	2	75	122
	Dump truck	113	2	75	
	Concrete mixer truck	108	4	50	
	Mobile telescopic crane	110	1	50	
	Concrete pump	106	2	50	
	Water pump	93	1	100	
	Hand-held pneumatic breaker	111	1	75	
	Compressor	103	3	50	
	Poker vibrator	106	3	50	
	Excavator mounted rock breaker	121	1	50	
Excavate and lay site cables	Tracked excavator	113	2	100	122
	Dump truck	113	2	75	
	Tractor (towing equipment)	108	1	75	
	Tractor (towing trailer)	107	1	75	
	Vibratory plate	108	1	50	
	Excavator mounted rock breaker	121	1	50	
Erect turbines	Mobile telescopic crane	110	2	75	119
	Lorry	108	1	75	
	Diesel generator	102	1	100	
	Torque guns[33]	111	4	100	
Lay cable to substation	Wheeled loader	108	1	100	120
	Saws	114	1	50	
	Hydraulic breaker	121	1	50	
	Dump truck	113	1	75	
	Tipper lorry	107	1	50	
	Vibratory plate	108	1	75	

[33] Assumed equal to Hand-held pneumatic breaker

Table 12.19: Construction Phases and Sound Power Levels					
Activities	**Plant**	**Sound Power (L_{WA})**	**No. Items**	**Activity Duration (%)**	**Effective Sound Power (L_{WA})**
	Tandem roller	102	1	75	
	Tractor & cable drum trailer	108	1	50	
	Lorry	108	1	75	

12.110 Predictions of noise levels have been carried out using the methods prescribed in Annex F of BS 5228-1:2009[34] with adoption of the worst case scenario where all major construction activities take place at the nearest possible location to each assessed house. The locations of the construction activities are taken from the infrastructure drawing, Figure 4.1. The results of these predictions, made at four representative critical properties to the Proposed Wind Farm Development, are shown in Table 12.20.

12.111 In all cases average noise levels over the construction period will be lower as the worst case is presented for when the activities are closest to the property.

Table 12.20: Results of Construction Noise Predictions				
Activity*	**Predicted Sound Pressure Level (dB L_{Aeq})**			
	Little Aitnoch	Kerrow Farmhouse	Achnabechan Farm	New Inn
Construct site tracks	48.8	47.7	46.8	45.0
Construct temporary construction compound	41.1	37.8	42.6	38.6
Construct Sub-Station	36.0	34.0	38.0	34.8
Construct crane hardstandings	46.8	45.7	44.5	42.9
Construct turbine foundations	48.6	47.5	46.3	44.7
Excavate and lay site cables	48.0	47.0	45.7	44.1
Erect turbines	45.1	44.0	42.8	41.2
Lay cable to substations	47.0	45.9	44.7	43.1
*Note that these activities do not all take place simultaneously, see paragraph **Error! Reference source not found.**				

Construction Traffic

12.112 Due to the provision of construction material and wind farm components, vehicle movements either into or away from the Site shall increase levels of traffic flow on public roads in the area. Traffic regularly accessing the Site is described in **Chapter 14: Access, Traffic and Transport** and is assumed to be characterised by the sound power levels of Dump Trucks, Lorries and Concrete Mixers as a worst case.

12.113 To represent the worst case, the construction noise assessment assumes the construction traffic noise to be characterised by the sound power levels of dumper trucks, lorries and concrete mixers during the most intense periods of activity. This is estimated to be a maximum of 236 vehicle movements per day.

12.114 Construction traffic noise has been quantified at this location using the method described in BS 5228:2009 Part 1. New Inn has been identified as being representative of a worst case receptor to construction traffic noise due to its proximity to the transport route. Other properties along the transport route will experience similar construction traffic noise levels as New Inn. For the purpose of this assessment it is assumed that 100 % of the construction traffic will access the Site past New Inn.

12.115 Using the distances from residential properties to the centre of the relevant carriageway where site traffic will be, the noise levels predicted are presented in Table 12.21. According to the assumptions made the maximum sound pressure level due to traffic flows at the most intensive period of activity will be 59.3 dB L_{Aeq}.

Table 12.21: Results of the Traffic Noise Predictions				
Activity	**Predicted Sound Pressure Level (dB L_{Aeq})**			
	Little Aitnoch	Kerrow Farmhouse	Achnabechan Farm	New Inn
Dump Truck	38.1	36.6	42.4	59.3
Lorry	32.1	30.5	36.3	53.2
Concrete mixer truck	34.6	33.1	38.9	55.8
Total	38.1	36.6	42.4	59.3

12.116 Worst case construction noise levels may arise when the following simultaneous activities occur: construction of site tracks, temporary construction compound, laying cables to the sub-station, crane hardstandings, turbine foundations and the excavation and laying of site cables. Therefore cumulative predictions of these construction activities and the additional noise contribution from construction traffic have been calculated and are shown in Table 12.22.

12.117 It should be noted that the predictions exclude the screening effects of local topography therefore actual levels of noise experienced at nearby residential properties could be lower.

[34] A 50% mixed ground attenuation has been used throughout to conservatively account for the arable nature of ground conditions at the proposed wind farm site.

Table 12.22: Predicted Noise Due to Combined Traffic Noise and Turbine Construction				
Activity	**Predicted Sound Pressure Level (dB L_{Aeq})**			
	Little Aitnoch	Kerrow Farmhouse	Achnabechan Farm	New Inn
Construction Plant Noise	54.4	53.2	52.6	50.7
Traffic Noise	38.1	36.6	42.4	59.3
Combined Noise	54.4	53.2	52.6	59.9

Assessment of Construction Noise

12.118 Table 12.22 shows that predicted noise levels from the combined effect of increased traffic flows and activities associated with peak construction of the wind farm are below the 65 dB(A) daytime target level specified by BS 5228-1:2009 at all locations. The predictions made represent the worst case combination of most intensive traffic activity with simultaneous construction activity at the nearest possible location to each noise receptor.

Mitigation

Mitigation by Design

12.119 One of the key turbine layout design constraint considerations was the minimisation of potential noise impacts at the nearest residential receptors. Subsequently, the turbine layout was revised through the design evolution process, to ensure that recommended noise limits were achieved at all surrounding properties. The design evolution process is described in **Chapter 3: Site Selection and Design Evolution**.

Mitigation During Operation

12.120 Due to the final design of the Proposed Wind Farm Development, no mitigation measures are required for the operation of the proposed turbines as the Proposed Wind Farm Development complies with the relevant noise criteria.

12.121 It is worth noting that the operation of many modern turbines may be altered by changing the pitch of the wind turbine blades resulting in a trade-off between power production & noise reduction. Therefore in the unlikely event that noise levels at nearby neighbours need require mitigation once they become operational, there is mechanism for enacting this.

12.122 Before a turbine type could be employed, RES' standard practice would be to seek to obtain a warranty from the manufacturer that the turbines will not incur a tonal penalty at the nearest noise sensitive properties, based upon the ETSU-R-97 guideline definition (ETSU, 1996)[2].

12.123 If the Proposed Wind Farm Development is successful in its application for section 36 consent any resulting decision notice would be likely to contain noise conditions which would provide a degree of protection to nearby residents in the unlikely event that wind farm noise would give rise to complaint. **Technical Appendix 12.4** contains a set of conditions that RES considers appropriate. Any final conditions attached to the proposal, if accepted, would be according to the discretion of decision maker.

Mitigation during Construction

12.124 For all activities, measures will be taken to reduce noise levels with due regard to practicality and cost as per the concept of 'best practicable means' as defined in Section 72 of the Control of Pollution Act 1974.

12.125 BS 5228-1:2009 states that the 'attitude of the contractor' is important in minimising the likelihood of complaints and therefore consultation with the local authority should occur along with letter drops to inform residents of intended activity. Non-acoustic factors, which influence the overall level of complaints such as mud on roads and dust generation, will also be controlled.

12.126 Furthermore, the following noise mitigation options will be implemented where appropriate:

- Consideration will be given to noise emissions when selecting plant and equipment to be used on site. Where appropriate, quieter items of plant and equipment will be given preference;
- All equipment should be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable;
- Stationary noise sources will be sited as far away as reasonably possible from residential properties and where necessary and appropriate, acoustic barriers will be used to screen them;
- The movement of vehicles to and from the Site will be controlled and employees will be instructed to ensure compliance with the noise control measures adopted.

12.127 Site operations will be limited to 0700-1900 Monday to Saturday except during turbine erection and commissioning or during periods of emergency work. Should it be considered necessary to reduce noise levels from the conservative predicted levels made, then the following mitigation measures would be considered to adhere to the 55dB(A) target level for Saturdays 1300-1900 only:

- The number of construction activities occurring simultaneously would be reduced; and
- Construction traffic would also be reduced as appropriate.

12.128 There are many strategies to reduce construction noise by the limitation of activities that would result in predicted noise levels being lower than the specified target. Any such measures should be considered adequate and the mitigation adopted should not be limited to the measures proposed.

Assessment of Residual Impacts

Residual Operational Impacts

12.129 The acoustic assessment shows that predicted noise levels at the nearest properties do not exceed either night-time or quiet day time limits under all considered conditions therefore

no significant impacts are expected. It is noted that this should not be interpreted to mean that wind farm operational noise will necessarily be inaudible (or masked by background noise) under all conditions, but that the levels of noise are acceptable and in accordance with relevant legislation, guidance and accepted standards.

Residual Construction Impacts

12.130 Predicted noise from worst case combination of increased traffic and site construction noise will not exceed relevant criteria and therefore no significant impacts are expected.

Cumulative Impacts

Cumulative Operational Noise Assessment

12.131 An assessment of the cumulative acoustic impact of the proposed Cairn Duhie Wind Farm, the consented Berry Burn Wind Farm, the proposed Hill of Glaschyle Wind Farm, the operational Paul's Hill Wind Farm and the consented single wind turbine at Logie Home Farm, has been undertaken in accordance with the guidance on wind farm noise assessment as issued in the DTI publication, 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97). The operational Paul's Hill Wind Farm and the consented single wind turbine at Logie Home Farm were not assessed further because predicted noise levels indicate these wind farms do not have a cumulative impact with the proposed Cairn Duhie Wind Farm[35].

12.132 ETSU-R-97 states:

"*It is clearly unreasonable to suggest that, because a wind farm has been constructed in the vicinity in the past which resulted in increased noise levels at some properties, the residents of those properties are now able to tolerate higher noise levels still. The existing wind farm should not be considered as part of the prevailing background noise.*"

12.133 The locations of the proposed turbines at the Cairn Duhie, as well as those at Berry Burn and Hill of Glaschyle wind farms, are shown in Figure 12.2.

12.134 The nearest neighbours to the proposed Cairn Duhie turbines are those detailed in Table 12.9. Other properties may be closer to the cumulative sites but have not been considered due to the negligible contribution of noise from the proposed Cairn Duhie wind farm.

The nearest neighbours to the proposed Cairn Duhie turbines, the consented Berry Burn turbines, and the proposed Hill of Glaschyle turbines are those detailed in Table 12.23.

Considering the proposed Cairn Duhie Wind Farm, the consented Berry Burn turbines, and the proposed Hill of Glaschyle turbines, the distances from each house to the nearest turbine are given in Table 12.23. It should be noted that the Berry Burn turbines are not included in Table 12.23 as these turbines are located further from the houses than those at Cairn Duhie and Hill of Glaschyle. These turbines are not considered to be the closest turbines to the nearby neighbours considered below.

Table 12.23: Location of Nearby Neighbours & Distances to Nearest Turbine

House ID	House Name	Distance / m	Nearest Turbine
H1	Aitnoch Farmhouse	2069	T1
H2	Little Aitnoch	1165	T1
H3	Kerrow Farmhouse	1300	T6
H4	Braemoray Lodge	1348	T11
H5	The White House	1698	T11
H6	1 Drumore Cottages	1762	T14
H7	3 Drumore Cottages	1770	T14
H8	2 Drumore Cottages	1769	T14
H9	Glenferness Mains	2251	T14
H10	Achnabechan Farm	1472	T14
H11	Culfearn	1796	T16
H12	Tombain	2569	T16
H13	Factors Cottage	1880	T14
H14	Tomnarroch	1576	T19
H15	Tomdow	2596	T16
H16	Tomdow Cottage	2642	T16
H17	Leonach Cottage	1662	T19
H18	6 Glenferness	1667	T19
H19	Birch Cottage	1672	T19
H20	Sturrock	1680	T19
H21	Smiddy House	1698	T19
H22	Rose Cottage	1695	T19
H23	The Old Post Office House	1704	T19
H24	Bungalow	1716	T19
H25	New Inn	1734	T19
H26	Glebe Cottage	2456	T19
H27	Roundwood House	2456	T19
H28	Muckle Lyne	1348	T20
H29	Little Lyne	1470	T20
H30	Head Foresters House	1974	T19
H32	1 Forestry Houses	2137	T19
H33	2 Forestry Houses	2142	T19

[35]Cumulative wind farms are not assessed where the predicted noise level of the cumulative wind farm is more than 10 dB below that of Cairn Duhie

Table 12.23: Location of Nearby Neighbours & Distances to Nearest Turbine			
House ID	**House Name**	**Distance / m**	**Nearest Turbine**
H34	3 Forestry Houses	2146	T19
H35	4 Forestry Houses	2151	T19
H36	5-6 Forestry Houses	2148	T19
H37	The Mount	1784	T20
H38	Score Farm	2046	T20
H39	Airdrie Mill	1977	T20
H40	Logie Farm	2781	T20
H41	Logie Farm Riding Centre	2795	T20
H42	Airdrie Farm	2988	T20
H46	Property A	1641	T14
H47	The Lodge	2010	T14
H48	The Old Schoolhouse	1703	T19
H50	Wester Tilliglens	3174	S3
H51	Wester Glenernie	3086	S3
H52	Refouble	2880	T3
H53	Milltown	2864	T3
H54	Ballindore	2601	T9
H55	Kennels	3012	T9
Turbines prefixed “T” are the proposed Cairn Duhie turbines Turbines prefixed “S” are the proposed Hill of Glaschyle turbines			

Cumulative Assessment Methodology

12.135 Predictions of the cumulative noise level due to the operation of the proposed Cairn Duhie Wind Farm, the consented Berry Burn Wind Farm, and the proposed Hill of Glaschyle Wind Farm are made. The cumulative predicted noise levels are then compared to acoustic acceptance criteria specified by relevant guidance, ETSU-R-97, to determine whether the cumulative acoustic impact would be deemed acceptable.

Berry Burn Wind Farm

12.136 The Berry Burn Wind Farm noise conditions are used in this cumulative assessment as a worst case assumption. These noise limits are based on the Section 36 Consent and Deemed Planning Permission document (Scottish Ministers, 2009)[36].

12.137 The assumed noise levels for Berry Burn Wind Farm are derived as follows:

i. Predictions are made using appropriate turbine noise data;

ii. At the most critical property to the relevant project comparison is made between the predictions in step 1 and the limits from the noise conditions; &

iii. The predictions in step 1 are scaled by the minimum margin between the predictions and the limits from the noise conditions. This yields predicted noise levels for the relevant wind farm which do not exceed the noise conditions and are equal to the noise conditions at the critical property and wind speed. The resulting predictions differ for quiet daytime and night time periods due to the different noise conditions for these periods.

Note this method is referred to as the ‘Controlling Property’ method in the Good Practice Guide (Institute of Acoustics, 2013)[22].

12.138 Berry Burn wind farm is a consented wind farm under construction and it is understood they have employed an Enercon E-70 turbine. The data used is that from the Hill of Glaschyle Environmental Statement which proposes the same turbine type (Hill of Glaschyle, 2013)[37]. An uncertainty factor of +1dB was included in the Hill of Glaschyle acoustic assessment. The Planning Consent document states that the noise levels at nearby properties should not exceed 35dB $L_{A90,10min}$ at the nearest noise-sensitive property for both day and night periods, except at the property “Rochuln”, where a 45 dB $L_{A90,10min}$ limit is specified (Scottish Ministers, 2009)[36]. Therefore, because this wind farm is allowed to produce noise levels up to the limits in the planning conditions this has been considered in this cumulative assessment.

12.139 The assumed details, as used in this analysis, are as follows:

- a hub height of 60 m;
- a rotor diameter of 70 m;
- sound power levels, L_{WA}, for standardised 10 m height wind speeds (v_{10}) as shown in Table 12.24;
- 1/1 octave band spectra, standardised 10 m height wind speeds (v_{10}), as shown in Table 12.25; and
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

Table 12.24: Sound Power Levels for the Enercon E-70 2.3MW Wind Turbine for use at Berry Burn	
Standardised 10m Height Wind Speed, v_{10} / ms^{-1}	**A-Weighted Sound Power Level / dB(A) re 1 pW**
5	94.6
6	99.8
7	102.4
8	104.1
9	105.5
10	105.5

[36] Scottish Ministers, 2009. “Consent and Deemed Planning Permission by the Scottish Ministers for the Construction and Operation of the Berry Burn Wind Powered Electricity Generating Station in the Altyre Estate, Near Forres, Moray”

[37] Hill of Glaschyle, 2013. Planning Application 13/00053/EIA

Table 12.25: 1/1 Octave Band Sound Power Level Spectrum for the Enercon E-70 2.3MW Wind Turbine for use at Berry Burn	
Octave Band / Hz	A-Weighted Sound Power Level / dB(A) re 1 pW
	8ms^{-1}
63	88.0
125	96.6
250	99.1
500	97.7
1000	96.2
2000	92.9
4000	86.0
8000	78.4
OVERALL	104.1

Hill of Glaschyle

12.140 The Environmental Statement for the proposed Hill of Glaschyle wind farm presents an Enercon E-70 turbine (Hill of Glaschyle, 2013)[37]. The data used in this assessment is that presented within the Hill of Glaschyle Environmental Statement. An uncertainty factor of +1dB was included in the Hill of Glaschyle Environmental Statement. The details, as used in this analysis, are as follows:

- a hub height of 64 m;
- a rotor diameter of 70 m;
- sound power levels, L_{WA}, for standardised 10 m height wind speeds (v_{10}) as shown in Table 12.26;
- 1/1 octave band spectra, standardised 10 m height wind speeds (v_{10}), as shown in Table 12.27; and
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

Table 12.26: Sound Power Levels for the Enercon E-70 2.3MW Wind Turbine assumed for use at Hill of Glaschyle	
Standardised 10m Height Wind Speed, v_{10} / ms^{-1}	A-Weighted Sound Power Level / dB(A) re 1 pW
5	94.6
6	99.8
7	102.4
8	104.1
9	105.5

Table 12.26: Sound Power Levels for the Enercon E-70 2.3MW Wind Turbine assumed for use at Hill of Glaschyle	
Standardised 10m Height Wind Speed, v_{10} / ms^{-1}	A-Weighted Sound Power Level / dB(A) re 1 pW
10	105.5

Table 12.27: 1/1 Octave Band Sound Power Level Spectrum for the Enercon E-70 2.3MW Wind Turbine assumed for use at Hill of Glaschyle	
Octave Band / Hz	A-Weighted Sound Power Level / dB(A) re 1 pW
	8ms^{-1}
63	88.0
125	96.6
250	99.1
500	97.7
1000	96.2
2000	92.9
4000	86.0
8000	78.4
OVERALL	104.1

Cumulative Prediction of Noise Levels at Receivers

12.141 In acoustic practice it is generally accepted that where a difference in noise immission levels due to each noise source is greater than 10 dB(A) that there is negligible cumulative effect and the smaller source can be ignored. Where the predicted noise levels from Hill of Glaschyle and Berry Burn are more than 10 dB less than those of Cairn Duhie they have not been considered.

12.142 Predicted noise levels due to Berry Burn have been amended to account for 'headroom' between the actual noise level and noise limits (Good Practice Guide, 2013). This means that third party wind farms are assumed to be operating at their maximum permitted noise level due to their third-party status, as they could theoretically operate up to these limits. This method is described in paragraph 12.136 and 12.137.

12.143 Noise immission levels at the nearest neighbours due to the cumulative acoustic impact of the proposed Cairn Duhie and Hill of Glaschyle wind farms, and the consented Berry Burn wind farm which is under construction have been calculated using the method described.

Table 12.28 shows the cumulative predicted noise immission levels at the nearest neighbours for both quiet waking hours and night-time, at each wind speed considered. The maximum predicted noise immission level is 38.7 dB(A) for Kerrow Farmhouse (at v_{10} equal to 9 ms^{1}).

Table 12.28: Predicted Noise Levels at Nearby Dwellings due to Cumulative Impact (dB(A) re 20 μPa)

House ID	House Name	Reference Wind Speed (Standardised v_{10}) / ms^{-1}									
		3	4	5	6	7	8	9	10	11	12
H1	Aitnoch Farmhouse	25.2	25.2	27.5	30.7	33.1	34.5	34.7	33.8	33.5	33.6
H2	Little Aitnoch	**29.2**	**29.2**	**31.9**	**35.0**	**37.1**	**38.2**	**38.2**	**36.9**	**36.5**	**36.6**
H3	Kerrow Farmhouse	29.4	29.4	31.7	34.8	37.3	38.5	38.7	37.6	37.2	37.3
H4	Braemoray Lodge	29.3	29.3	31.3	34.9	37.1	38.3	38.5	37.5	37.2	37.3
H5	The White House	29.2	29.2	31.1	34.8	37.1	38.4	38.6	37.6	37.3	37.3
H6	1 Drumore Cottages	26.1	26.1	28.7	31.8	34.0	35.6	35.8	34.7	34.3	34.4
H7	3 Drumore Cottages	26.5	26.5	28.7	31.7	34.0	35.7	35.8	34.7	34.4	34.5
H8	2 Drumore Cottages	26.5	26.5	28.7	31.7	34.0	35.7	35.8	34.7	34.4	34.5
H9	Glenferness Mains	24.3	24.3	26.5	29.5	31.8	33.5	33.7	32.6	32.3	32.4
H10	Achnabechan Farm	27.6	27.6	30.2	33.2	35.4	36.5	37.0	35.8	35.5	35.5
H11	Culfearn	27.9	27.9	30.0	33.4	35.8	37.1	37.5	36.6	36.3	36.4
H12	Tombain	27.3	27.3	28.8	32.7	35.2	36.7	37.5	37.0	36.8	36.9
H13	Factors Cottage	25.6	25.6	28.2	31.3	33.5	34.7	35.3	34.1	33.8	33.9
H14	Tomnarroch	26.7	26.7	29.3	32.3	34.5	35.7	36.2	35.0	34.6	34.7
H15	Tomdow	26.9	26.9	28.4	32.3	34.8	36.3	37.1	36.5	36.4	36.4
H16	Tomdow Cottage	26.8	26.8	28.3	32.2	34.7	36.2	37.0	36.5	36.4	36.4
H17	Leonach Cottage	25.6	25.6	28.2	31.2	33.4	35.0	35.1	34.0	33.7	33.8
H18	6 Glenferness	25.9	25.9	28.1	31.2	33.7	35.0	35.1	34.0	33.7	33.8
H19	Birch Cottage	25.8	25.8	27.9	31.0	33.5	34.8	35.0	33.9	33.6	33.6
H20	Sturrock	25.2	25.2	27.3	30.8	33.0	34.3	34.5	33.4	33.1	33.2
H21	Smiddy House	25.0	25.0	27.1	30.6	32.8	34.0	34.3	33.2	32.9	32.9
H22	Rose Cottage	25.0	25.0	27.1	30.6	32.8	34.0	34.3	33.2	32.9	32.9
H23	The Old Post Office House	24.9	24.9	26.9	30.4	32.7	33.8	34.1	33.0	32.7	32.8
H24	Bungalow	24.6	24.6	26.6	30.1	32.4	33.7	33.9	32.9	32.6	32.6
H25	New Inn	24.2	24.2	26.1	29.7	32.0	33.3	33.5	32.5	32.2	32.3
H26	Glebe Cottage	23.5	23.5	25.3	28.9	31.4	32.7	33.0	32.0	31.7	31.7
H27	Roundwood House	23.5	23.5	25.3	28.9	31.4	32.7	33.0	32.0	31.7	31.7
H28	Muckle Lyne	27.8	27.8	29.8	33.4	35.6	36.8	37.0	36.0	35.7	35.8
H29	Little Lyne	27.5	27.5	29.5	33.0	35.3	36.5	36.8	35.7	35.4	35.5
H30	Head Foresters House	23.2	23.2	25.4	28.7	31.0	32.3	32.6	31.6	31.4	31.4
H32	1 Forestry Houses	22.6	22.6	24.7	28.1	30.4	31.7	32.1	31.2	31.0	31.0
H33	2 Forestry Houses	22.5	22.5	24.7	28.1	30.3	31.7	32.1	31.2	31.0	31.0
H34	3 Forestry Houses	22.5	22.5	24.6	28.0	30.3	31.7	32.1	31.2	30.9	31.0
H35	4 Forestry Houses	22.5	22.5	24.6	28.0	30.3	31.7	32.0	31.2	30.9	31.0

Table 12.28: Predicted Noise Levels at Nearby Dwellings due to Cumulative Impact (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (Standardised v_{10}) / ms^{-1}									
		3	4	5	6	7	8	9	10	11	12
H36	5-6 Forestry Houses	22.5	22.5	24.6	28.0	30.3	31.7	32.1	31.2	30.9	31.0
H37	The Mount	25.6	25.6	27.9	31.2	33.6	34.9	35.2	34.2	33.9	34.0
H38	Score Farm	25.0	25.0	27.1	30.5	33.0	34.3	34.6	33.8	33.5	33.6
H39	Airdrie Mill	24.9	24.9	27.0	30.4	32.7	34.0	34.3	33.4	33.1	33.2
H40	Logie Farm	20.9	20.9	22.6	26.3	28.7	30.2	30.8	30.1	29.9	30.0
H41	Logie Farm Riding Centre	20.8	20.8	22.5	26.2	28.7	30.1	30.8	30.1	30.0	30.0
H42	Airdrie Farm	22.2	22.2	23.9	27.7	30.2	31.7	32.3	31.7	31.5	31.5
H46	Property A	26.7	26.7	29.3	32.3	34.5	35.7	35.7	34.9	34.6	34.7
H47	The Lodge	25.3	25.3	27.9	30.9	33.2	34.8	35.1	33.8	33.5	33.6
H48	The Old Schoolhouse	24.9	24.9	26.8	30.4	32.7	33.8	34.1	33.0	32.7	32.8
H50	Wester Tillieglens	25.9	25.9	26.6	31.2	33.8	35.4	36.5	36.3	36.3	36.3
H51	Wester Glenernie	25.4	25.4	26.3	30.7	33.3	34.9	35.9	35.7	35.6	35.6
H52	Refouble	21.7	21.7	23.5	27.1	29.6	30.8	31.2	30.1	29.9	29.9
H53	Milltown	21.4	21.4	23.3	26.9	29.3	30.7	30.9	29.9	29.6	29.7
H54	Ballindore	23.3	23.3	25.3	28.8	31.2	32.5	32.7	31.6	31.3	31.4
H55	Kennels	22.2	22.2	24.0	27.6	30.1	31.4	31.7	30.7	30.4	30.5

Values in bold indicate the maximum predicted noise level
Shading indicates properties with predicted noise levels greater than 35 dB(A), refer to paragraph

12.144 As described previously the ETSU-R-97 document presents a simplified noise assessment procedure where if noise is limited to $L_{A90,10min}$ of 35 dB(A) up to wind speeds of 10 ms^{-1} at 10 m height such low noise levels themselves would offer sufficient protection of amenity.

12.145 Considering the information in Table 12.28 it may be seen that noise levels at 26 of 50 nearest neighbours considered are below the 35 dB(A) limit, indicating that the noise immission levels would be regarded as acceptable and the householders' amenities as receiving 'sufficient protection'.

12.146 There are 24 properties that do not pass this simplified noise criteria as highlighted in Table 12.28. The 24 properties with predicted noise levels greater than 35 dB(A) have been considered in the acoustic assessment in addition to the properties where RES has conducted background noise surveys as a conservative measure.

Acoustic Acceptance Criteria

12.147 The acoustic assessment criteria as used for the proposed Cairn Duhie wind farm has been adopted as the acceptance criteria for the cumulative impact of the three wind farms. It should be noted that due to the cumulative number of turbines, and in accordance with the guidance of ETSU R 97, a higher quiet waking hours lower limit would be permissible, but in accordance with THC noise guidance[38], RES have adopted a lower limit of 35 dB(A) during quiet waking hours. Also in accordance with THC noise guidance, a 38 dB(A) lower limit has been adopted for night-time, this is not in accordance with ETSU-R-97 but has been adopted in this assessment as a conservative measure.

12.148 As recommended in ETSU-R-97, the absolute lower noise limits may be increased up to 45 dB(A) if the occupant has a financial involvement in the wind farm. However, these limits have not been adopted in the presented results.

12.149 The survey locations inferred to be representative for each property considered are shown in Table 12.16.

Acoustic Assessment

12.150 Table 12.29 shows a comparison of the predicted noise levels with the recommended quiet waking hours noise limits for each house where the full assessment procedure is being applied. The cumulative predicted noise levels at 1 ms^{-1}, 2 ms^{-1} and 3 ms^{-1} have been

[38] The Highland Council, "Noise Assessment Guidance For Wind Farms" 07/05/2013

assumed as equal to 4 ms^{-1}, though this is a conservative measure. The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit. A negative value indicates that the predicted noise level is within the limit. Table 12.30 shows a comparison with the recommended night-time noise limits.

12.151 Noise levels at all locations are within both the quiet waking hours limit and night-time noise limits, at all wind speeds considered.

12.152 The minimum margin of predicted noise levels below derived noise limits, for all wind speeds considered, during quiet waking hours, is -0.2dB(A). Similarly the minimum margin during night-time periods, for all wind speeds considered, is -0.9 dB(A). The minimum margins are highlighted in the relevant tables. It must be reiterated that these margins are for an unrealistic worst case when the property with this minimum margin is downwind of all wind farms considered.

Table 12.29: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits – (dB(A) re 20 μPa)

		Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
House ID	House Name	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	29.2	35.0	-5.8	29.2	35.0	-5.8	29.2	35.0	-5.8	29.2	35.0	-5.8
H3	Kerrow Farmhouse	29.4	36.5	-7.1	29.4	36.5	-7.1	29.4	36.7	-7.3	29.4	37.5	-8.1
H4	Braemoray Lodge	29.3	35.0	-5.7	29.3	35.0	-5.7	29.3	35.0	-5.7	29.3	35.0	-5.7
H5	The White House	29.2	36.5	-7.3	29.2	36.5	-7.3	29.2	36.7	-7.5	29.2	37.5	-8.3
H6	1 Drumore Cottages	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9	26.1	35.0	-8.9
H7	3 Drumore Cottages	26.5	35.0	-8.5	26.5	35.0	-8.5	26.5	35.0	-8.5	26.5	35.0	-8.5
H8	2 Drumore Cottages	26.5	35.0	-8.5	26.5	35.0	-8.5	26.5	35.0	-8.5	26.5	35.0	-8.5
H10	Achnabechan Farm	27.6	35.0	-7.4	27.6	35.0	-7.4	27.6	35.0	-7.4	27.6	35.0	-7.4
H11	Culfearn	27.9	36.5	-8.6	27.9	36.5	-8.6	27.9	36.7	-8.8	27.9	37.5	-9.6
H12	Tombain	27.3	36.5	-9.2	27.3	36.5	-9.2	27.3	36.7	-9.4	27.3	37.5	-10.2
H13	Factors Cottage	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4
H14	Tomnarroch	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3
H15	Tomdow	26.9	36.5	-9.6	26.9	36.5	-9.6	26.9	36.7	-9.8	26.9	37.5	-10.6
H16	Tomdow Cottage	26.8	36.5	-9.7	26.8	36.5	-9.7	26.8	36.7	-9.9	26.8	37.5	-10.7
H17	Leonach Cottage	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4
H18	6 Glenferness	25.9	35.0	-9.1	25.9	35.0	-9.1	25.9	35.0	-9.1	25.9	35.0	-9.1
H19	Birch Cottage	25.8	35.0	-9.2	25.8	35.0	-9.2	25.8	35.0	-9.2	25.8	35.0	-9.2
H28	Muckle Lyne	27.8	35.0	-7.2	27.8	35.0	-7.2	27.8	35.0	-7.2	27.8	35.0	-7.2
H29	Little Lyne	27.5	35.0	-7.5	27.5	35.0	-7.5	27.5	35.0	-7.5	27.5	35.0	-7.5
H37	The Mount	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4	25.6	35.0	-9.4
H46	Property A	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3	26.7	35.0	-8.3
H47	The Lodge	25.3	35.0	-9.7	25.3	35.0	-9.7	25.3	35.0	-9.7	25.3	35.0	-9.7
H48	The Old Schoolhouse	24.9	35.0	-10.1	24.9	35.0	-10.1	24.9	35.0	-10.1	24.9	35.0	-10.1

Table 12.29: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits – (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H50	Wester Tillieglens	25.9	35.0	-9.1	25.9	35.0	-9.1	25.9	35.0	-9.1	25.9	35.0	-9.1
H51	Wester Glenernie	25.4	36.5	-11.1	25.4	36.5	-11.1	25.4	36.7	-11.3	25.4	37.5	-12.1
House ID	**House Name**	**Reference Wind Speed (v_{10}) / ms^{-1}**											
		5			6			7			8		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	31.9	35.0	-3.1	35.0	35.2	-0.2	37.1	38.0	-0.9	38.2	40.6	-2.4
H3	Kerrow Farmhouse	31.7	38.7	-7.0	34.8	40.2	-5.4	37.3	41.8	-4.5	38.5	43.5	-5.0
H4	Braemoray Lodge	31.3	37.4	-6.1	34.9	40.6	-5.7	37.1	44.1	-7.0	38.3	47.6	-9.3
H5	The White House	31.1	38.7	-7.6	34.8	40.2	-5.4	37.1	41.8	-4.7	38.4	43.5	-5.1
H6	1 Drumore Cottages	28.7	35.0	-6.3	31.8	35.0	-3.2	34.0	36.2	-2.2	35.6	38.6	-3.0
H7	3 Drumore Cottages	28.7	35.0	-6.3	31.7	35.0	-3.3	34.0	36.2	-2.2	35.7	38.6	-2.9
H8	2 Drumore Cottages	28.7	35.0	-6.3	31.7	35.0	-3.3	34.0	36.2	-2.2	35.7	38.6	-2.9
H10	Achnabechan Farm	30.2	35.0	-4.8	33.2	35.0	-1.8	35.4	36.2	-0.8	36.5	38.6	-2.1
H11	Culfearn	30.0	38.7	-8.7	33.4	40.2	-6.8	35.8	41.8	-6.0	37.1	43.5	-6.4
H12	Tombain	28.8	38.7	-9.9	32.7	40.2	-7.5	35.2	41.8	-6.6	36.7	43.5	-6.8
H13	Factors Cottage	28.2	35.0	-6.8	31.3	35.0	-3.7	33.5	36.2	-2.7	34.7	38.6	-3.9
H14	Tomnarroch	29.3	36.5	-7.2	32.3	38.9	-6.6	34.5	41.6	-7.1	35.7	44.2	-8.5
H15	Tomdow	28.4	38.7	-10.3	32.3	40.2	-7.9	34.8	41.8	-7.0	36.3	43.5	-7.2
H16	Tomdow Cottage	28.3	38.7	-10.4	32.2	40.2	-8.0	34.7	41.8	-7.1	36.2	43.5	-7.3
H17	Leonach Cottage	28.2	36.5	-8.3	31.2	38.9	-7.7	33.4	41.6	-8.2	35.0	44.2	-9.2
H18	6 Glenferness	28.1	36.5	-8.4	31.2	38.9	-7.7	33.7	41.6	-7.9	35.0	44.2	-9.2
H19	Birch Cottage	27.9	36.5	-8.6	31.0	38.9	-7.9	33.5	41.6	-8.1	34.8	44.2	-9.4
H28	Muckle Lyne	29.8	35.0	-5.2	33.4	36.3	-2.9	35.6	38.1	-2.5	36.8	40.1	-3.3
H29	Little Lyne	29.5	35.0	-5.5	33.0	36.3	-3.3	35.3	38.1	-2.8	36.5	40.1	-3.6
H37	The Mount	27.9	35.0	-7.1	31.2	36.3	-5.1	33.6	38.1	-4.5	34.9	40.1	-5.2
H46	Property A	29.3	35.0	-5.7	32.3	35.0	-2.7	34.5	36.2	-1.7	35.7	38.6	-2.9
H47	The Lodge	27.9	35.0	-7.1	30.9	35.0	-4.1	33.2	36.2	-3.0	34.8	38.6	-3.8
H48	The Old Schoolhouse	26.8	36.5	-9.7	30.4	38.9	-8.5	32.7	41.6	-8.9	33.8	44.2	-10.4

Table 12.29: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits – (dB(A) re 20 μPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H50	Wester Tillieglens	26.6	35.0	-8.4	31.2	36.3	-5.1	33.8	38.1	-4.3	35.4	40.1	-4.7
H51	Wester Glenernie	26.3	38.7	-12.4	30.7	40.2	-9.5	33.3	41.8	-8.5	34.9	43.5	-8.6
House ID	**House Name**	**Reference Wind Speed (v_{10}) / ms^{-1}**											
		9			10			11			12		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	38.2	42.8	-4.6	36.9	44.3	-7.4	36.5	44.7	-8.2	36.6	44.7	-8.1
H3	Kerrow Farmhouse	38.7	45.1	-6.4	37.6	46.5	-8.9	37.2	47.6	-10.4	37.3	47.6	-10.3
H4	Braemoray Lodge	38.5	50.8	-12.3	37.5	53.6	-16.1	37.2	53.6	-16.4	37.3	53.6	-16.3
H5	The White House	38.6	45.1	-6.5	37.6	46.5	-8.9	37.3	47.6	-10.3	37.3	47.6	-10.3
H6	1 Drumore Cottages	35.8	41.4	-5.6	34.7	44.8	-10.1	34.3	44.8	-10.5	34.4	44.8	-10.4
H7	3 Drumore Cottages	35.8	41.4	-5.6	34.7	44.8	-10.1	34.4	44.8	-10.4	34.5	44.8	-10.3
H8	2 Drumore Cottages	35.8	41.4	-5.6	34.7	44.8	-10.1	34.4	44.8	-10.4	34.5	44.8	-10.3
H10	Achnabechan Farm	37.0	41.4	-4.4	35.8	44.8	-9.0	35.5	44.8	-9.3	35.5	44.8	-9.3
H11	Culfearn	37.5	45.1	-7.6	36.6	46.5	-9.9	36.3	47.6	-11.3	36.4	47.6	-11.2
H12	Tombain	37.5	45.1	-7.6	37.0	46.5	-9.5	36.8	47.6	-10.8	36.9	47.6	-10.7
H13	Factors Cottage	35.3	41.4	-6.1	34.1	44.8	-10.7	33.8	44.8	-11.0	33.9	44.8	-10.9
H14	Tomnarroch	36.2	46.8	-10.6	35.0	49.1	-14.1	34.6	49.1	-14.5	34.7	49.1	-14.4
H15	Tomdow	37.1	45.1	-8.0	36.5	46.5	-10.0	36.4	47.6	-11.2	36.4	47.6	-11.2
H16	Tomdow Cottage	37.0	45.1	-8.1	36.5	46.5	-10.0	36.4	47.6	-11.2	36.4	47.6	-11.2
H17	Leonach Cottage	35.1	46.8	-11.7	34.0	49.1	-15.1	33.7	49.1	-15.4	33.8	49.1	-15.3
H18	6 Glenferness	35.1	46.8	-11.7	34.0	49.1	-15.1	33.7	49.1	-15.4	33.8	49.1	-15.3
H19	Birch Cottage	35.0	46.8	-11.8	33.9	49.1	-15.2	33.6	49.1	-15.5	33.6	49.1	-15.5
H28	Muckle Lyne	37.0	42.2	-5.2	36.0	44.3	-8.3	35.7	46.5	-10.8	35.8	46.5	-10.7
H29	Little Lyne	36.8	42.2	-5.4	35.7	44.3	-8.6	35.4	46.5	-11.1	35.5	46.5	-11.0
H37	The Mount	35.2	42.2	-7.0	34.2	44.3	-10.1	33.9	46.5	-12.6	34.0	46.5	-12.5
H46	Property A	35.7	41.4	-5.7	34.9	44.8	-9.9	34.6	44.8	-10.2	34.7	44.8	-10.1
H47	The Lodge	35.1	41.4	-6.3	33.8	44.8	-11.0	33.5	44.8	-11.3	33.6	44.8	-11.2
H48	The Old Schoolhouse	34.1	46.8	-12.7	33.0	49.1	-16.1	32.7	49.1	-16.4	32.8	49.1	-16.3
H50	Wester Tillieglens	36.5	42.2	-5.7	36.3	44.3	-8.0	36.3	46.5	-10.2	36.3	46.5	-10.2

Table 12.29: Comparison of Predicted Noise Levels and Quiet Waking Hours Limits - (dB(A) re 20 μPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H51	Wester Glenernie	35.9	45.1	-9.2	35.7	46.5	-10.8	35.6	47.6	-12.0	35.6	47.6	-12.0

The term L_p is used to denote the predicted noise level due to the operation of the proposed wind farm
The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit
The shaded value denotes the maximum quiet waking hours ΔL value

Table 12.30: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 μPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8
H3	Kerrow Farmhouse	29.4	38.0	-8.6	29.4	38.0	-8.6	29.4	38.0	-8.6	29.4	38.0	-8.6
H4	Braemoray Lodge	29.3	38.0	-8.7	29.3	38.0	-8.7	29.3	38.0	-8.7	29.3	38.0	-8.7
H5	The White House	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8	29.2	38.0	-8.8
H6	1 Drumore Cottages	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9	26.1	38.0	-11.9
H7	3 Drumore Cottages	26.5	38.0	-11.5	26.5	38.0	-11.5	26.5	38.0	-11.5	26.5	38.0	-11.5
H8	2 Drumore Cottages	26.5	38.0	-11.5	26.5	38.0	-11.5	26.5	38.0	-11.5	26.5	38.0	-11.5
H10	Achnabechan Farm	27.6	38.0	-10.4	27.6	38.0	-10.4	27.6	38.0	-10.4	27.6	38.0	-10.4
H11	Culfearn	27.9	38.0	-10.1	27.9	38.0	-10.1	27.9	38.0	-10.1	27.9	38.0	-10.1
H12	Tombain	27.3	38.0	-10.7	27.3	38.0	-10.7	27.3	38.0	-10.7	27.3	38.0	-10.7
H13	Factors Cottage	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4
H14	Tomnarroch	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3
H15	Tomdow	26.9	38.0	-11.1	26.9	38.0	-11.1	26.9	38.0	-11.1	26.9	38.0	-11.1
H16	Tomdow Cottage	26.8	38.0	-11.2	26.8	38.0	-11.2	26.8	38.0	-11.2	26.8	38.0	-11.2
H17	Leonach Cottage	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4
H18	6 Glenferness	25.9	38.0	-12.1	25.9	38.0	-12.1	25.9	38.0	-12.1	25.9	38.0	-12.1
H19	Birch Cottage	25.8	38.0	-12.2	25.8	38.0	-12.2	25.8	38.0	-12.2	25.8	38.0	-12.2
H28	Muckle Lyne	27.8	38.0	-10.2	27.8	38.0	-10.2	27.8	38.0	-10.2	27.8	38.0	-10.2
H29	Little Lyne	27.5	38.0	-10.5	27.5	38.0	-10.5	27.5	38.0	-10.5	27.5	38.0	-10.5

Table 12.30: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H37	The Mount	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4	25.6	38.0	-12.4
H46	Property A	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3	26.7	38.0	-11.3
H47	The Lodge	25.3	38.0	-12.7	25.3	38.0	-12.7	25.3	38.0	-12.7	25.3	38.0	-12.7
H48	The Old Schoolhouse	24.9	38.0	-13.1	24.9	38.0	-13.1	24.9	38.0	-13.1	24.9	38.0	-13.1
H50	Wester Tillieglens	25.9	38.0	-12.1	25.9	38.0	-12.1	25.9	38.0	-12.1	25.9	38.0	-12.1
H51	Wester Glenernie	25.4	38.0	-12.6	25.4	38.0	-12.6	25.4	38.0	-12.6	25.4	38.0	-12.6
		Reference Wind Speed (v_{10}) / ms^{-1}											
		5			6			7			8		
House ID	**House Name**	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	31.9	38.0	-6.1	35.0	38.0	-3.0	37.1	38.0	-0.9	38.2	39.8	-1.6
H3	Kerrow Farmhouse	31.7	38.0	-6.3	34.8	38.0	-3.2	37.3	38.4	-1.1	38.5	39.6	-1.1
H4	Braemoray Lodge	31.3	38.0	-6.7	34.9	38.0	-3.1	37.1	39.8	-2.7	38.3	42.4	-4.1
H5	The White House	31.1	38.0	-6.9	34.8	38.0	-3.2	37.1	38.4	-1.3	38.4	39.6	-1.2
H6	1 Drumore Cottages	28.7	38.0	-9.3	31.8	38.0	-6.2	34.0	38.0	-4.0	35.6	38.0	-2.4
H7	3 Drumore Cottages	28.7	38.0	-9.3	31.7	38.0	-6.3	34.0	38.0	-4.0	35.7	38.0	-2.3
H8	2 Drumore Cottages	28.7	38.0	-9.3	31.7	38.0	-6.3	34.0	38.0	-4.0	35.7	38.0	-2.3
H10	Achnabechan Farm	30.2	38.0	-7.8	33.2	38.0	-4.8	35.4	38.0	-2.6	36.5	38.0	-1.5
H11	Culfearn	30.0	38.0	-8.0	33.4	38.0	-4.6	35.8	38.4	-2.6	37.1	39.6	-2.5
H12	Tombain	28.8	38.0	-9.2	32.7	38.0	-5.3	35.2	38.4	-3.2	36.7	39.6	-2.9
H13	Factors Cottage	28.2	38.0	-9.8	31.3	38.0	-6.7	33.5	38.0	-4.5	34.7	38.0	-3.3
H14	Tomnarroch	29.3	38.0	-8.7	32.3	38.0	-5.7	34.5	38.0	-3.5	35.7	40.0	-4.3
H15	Tomdow	28.4	38.0	-9.6	32.3	38.0	-5.7	34.8	38.4	-3.6	36.3	39.6	-3.3
H16	Tomdow Cottage	28.3	38.0	-9.7	32.2	38.0	-5.8	34.7	38.4	-3.7	36.2	39.6	-3.4
H17	Leonach Cottage	28.2	38.0	-9.8	31.2	38.0	-6.8	33.4	38.0	-4.6	35.0	40.0	-5.0
H18	6 Glenferness	28.1	38.0	-9.9	31.2	38.0	-6.8	33.7	38.0	-4.3	35.0	40.0	-5.0
H19	Birch Cottage	27.9	38.0	-10.1	31.0	38.0	-7.0	33.5	38.0	-4.5	34.8	40.0	-5.2
H28	Muckle Lyne	29.8	38.0	-8.2	33.4	38.0	-4.6	35.6	38.0	-2.4	36.8	38.0	-1.2
H29	Little Lyne	29.5	38.0	-8.5	33.0	38.0	-5.0	35.3	38.0	-2.7	36.5	38.0	-1.5
H37	The Mount	27.9	38.0	-10.1	31.2	38.0	-6.8	33.6	38.0	-4.4	34.9	38.0	-3.1

Table 12.30: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H46	Property A	29.3	38.0	-8.7	32.3	38.0	-5.7	34.5	38.0	-3.5	35.7	38.0	-2.3
H47	The Lodge	27.9	38.0	-10.1	30.9	38.0	-7.1	33.2	38.0	-4.8	34.8	38.0	-3.2
H48	The Old Schoolhouse	26.8	38.0	-11.2	30.4	38.0	-7.6	32.7	38.0	-5.3	33.8	40.0	-6.2
H50	Wester Tillieglens	26.6	38.0	-11.4	31.2	38.0	-6.8	33.8	38.0	-4.2	35.4	38.0	-2.6
H51	Wester Glenernie	26.3	38.0	-11.7	30.7	38.0	-7.3	33.3	38.4	-5.1	34.9	39.6	-4.7
House ID	**House Name**	**Reference Wind Speed (v_{10}) / ms^{-1}**											
		9			10			11			12		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H2	Little Aitnoch	38.2	43.7	-5.5	36.9	47.8	-10.9	36.5	47.8	-11.3	36.6	47.8	-11.2
H3	Kerrow Farmhouse	38.7	40.9	-2.2	37.6	42.4	-4.8	37.2	42.4	-5.2	37.3	42.4	-5.1
H4	Braemoray Lodge	38.5	44.9	-6.4	37.5	47.1	-9.6	37.2	48.9	-11.7	37.3	48.9	-11.6
H5	The White House	38.6	40.9	-2.3	37.6	42.4	-4.8	37.3	42.4	-5.1	37.3	42.4	-5.1
H6	1 Drumore Cottages	35.8	38.0	-2.2	34.7	38.8	-4.1	34.3	42.2	-7.9	34.4	42.2	-7.8
H7	3 Drumore Cottages	35.8	38.0	-2.2	34.7	38.8	-4.1	34.4	42.2	-7.8	34.5	42.2	-7.7
H8	2 Drumore Cottages	35.8	38.0	-2.2	34.7	38.8	-4.1	34.4	42.2	-7.8	34.5	42.2	-7.7
H10	Achnabechan Farm	37.0	38.0	-1.0	35.8	38.8	-3.0	35.5	42.2	-6.7	35.5	42.2	-6.7
H11	Culfearn	37.5	40.9	-3.4	36.6	42.4	-5.8	36.3	42.4	-6.1	36.4	42.4	-6.0
H12	Tombain	37.5	40.9	-3.4	37.0	42.4	-5.4	36.8	42.4	-5.6	36.9	42.4	-5.5
H13	Factors Cottage	35.3	38.0	-2.7	34.1	38.8	-4.7	33.8	42.2	-8.4	33.9	42.2	-8.3
H14	Tomnarroch	36.2	41.5	-5.3	35.0	42.0	-7.0	34.6	42.0	-7.4	34.7	42.0	-7.3
H15	Tomdow	37.1	40.9	-3.8	36.5	42.4	-5.9	36.4	42.4	-6.0	36.4	42.4	-6.0
H16	Tomdow Cottage	37.0	40.9	-3.9	36.5	42.4	-5.9	36.4	42.4	-6.0	36.4	42.4	-6.0
H17	Leonach Cottage	35.1	41.5	-6.4	34.0	42.0	-8.0	33.7	42.0	-8.3	33.8	42.0	-8.2
H18	6 Glenferness	35.1	41.5	-6.4	34.0	42.0	-8.0	33.7	42.0	-8.3	33.8	42.0	-8.2
H19	Birch Cottage	35.0	41.5	-6.5	33.9	42.0	-8.1	33.6	42.0	-8.4	33.6	42.0	-8.4
H28	Muckle Lyne	37.0	39.6	-2.6	36.0	41.1	-5.1	35.7	41.1	-5.4	35.8	41.1	-5.3
H29	Little Lyne	36.8	39.6	-2.8	35.7	41.1	-5.4	35.4	41.1	-5.7	35.5	41.1	-5.6
H37	The Mount	35.2	39.6	-4.4	34.2	41.1	-6.9	33.9	41.1	-7.2	34.0	41.1	-7.1

Table 12.30: Comparison of Predicted Noise Levels and Night-time Limits - (dB(A) re 20 µPa)

House ID	House Name	Reference Wind Speed (v_{10}) / ms^{-1}											
		1			2			3			4		
		L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H46	Property A	35.7	38.0	-2.3	34.9	38.8	-3.9	34.6	42.2	-7.6	34.7	42.2	-7.5
H47	The Lodge	35.1	38.0	-2.9	33.8	38.8	-5.0	33.5	42.2	-8.7	33.6	42.2	-8.6
H48	The Old Schoolhouse	34.1	41.5	-7.4	33.0	42.0	-9.0	32.7	42.0	-9.3	32.8	42.0	-9.2
H50	Wester Tillieglens	36.5	39.6	-3.1	36.3	41.1	-4.8	36.3	41.1	-4.8	36.3	41.1	-4.8
H51	Wester Glenernie	35.9	40.9	-5.0	35.7	42.4	-6.7	35.6	42.4	-6.8	35.6	42.4	-6.8

The term L_p is used to denote the predicted noise level due to the operation of the proposed wind farm
The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit
The shaded value denotes the maximum quiet Night-time ΔL value

Cumulative Construction Noise Assessment

12.153 Any noise for the construction of the other proposed wind farms is not likely to be ongoing at the same time as the construction of the Proposed Cairn Duhie Wind Farm. However if this is the case, and due to the location of the other proposed wind farms, then the site activities will be far enough away from each other to not have a cumulative impact.

Summary

12.154 The acoustic impact for the operation of the proposed Cairn Duhie wind farm on nearby neighbours has been assessed in accordance with the guidance on wind farm noise as issued in the DTI publication 'The Assessment and Rating of Noise from Wind Farms' (ETSU, 1996)[2]. To establish baseline conditions, background noise surveys were carried out at six nearby properties and the measured background noise levels used to determine appropriate noise limits, as specified by ETSU-R-97.

12.155 Operational noise levels were predicted using a noise propagation model, the Proposed Cairn Duhie Wind Farm layout, terrain data and assumed turbine emission data.

The predicted noise levels are within derived appropriate noise limits at all considered wind speeds.

The proposed Cairn Duhie Wind Farm therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby properties is regarded as acceptable.

12.156 A construction noise assessment has been assessed in accordance with BS 5228-1:2009 'Noise control on construction and open sites' Part 1 – Noise, and, with due regard to mitigation outlined, indicates that predicted noise levels likely to be experienced at representative critical properties are below relevant construction noise criteria.

12.157 A cumulative operational noise assessment was completed for the potential impact of the proposed Cairn Duhie Wind Farm alongside the consented Berry Burn Wind Farm, and the proposed Hill of Glaschyle Wind Farm. The predicted noise levels are within derived appropriate noise limits at all considered wind speeds.

Therefore the noise impact on the amenity of all nearby properties due to the cumulative impact of the Cairn Duhie Wind Farm, the Berry Burn Wind Farm and the proposed Hill of Glaschyle Wind Farm would be regarded as acceptable.

Table 12.31 Summary of Potential Impacts of the proposed wind farm, Mitigation and Residual Impacts

Likely Significant Impact	Mitigation Proposed	Means of Implementation	Outcome/Residual Impact
Operational			
Operational noise affecting nearest neighbours	Not required due to absence of identified significant impacts	Not applicable	No significant impacts identified
Construction			
Potential for noise to be created during construction activities	Not required due to absence of identified significant impacts	Not applicable	No significant impacts identified

13 Electromagnetic Interference, Aviation and Shadow Flicker

13.1 This chapter of the ES evaluates Electromagnetic Interference, Aviation and Shadow Flicker in relation to the Proposed Wind Farm Development and has been prepared by the Applicant.

13.2 The structure of this chapter follows a slightly different approach to the other assessment chapters within this ES as it contains technical assessments of the effects of the Proposed Wind Farm Development (as defined in Chapters 4 and 5) on three discrete topics, namely Electromagnetic Interference, Aviation and Shadow Flicker. The topics discussed follow a technical and non-subjective method of assessment.

Electromagnetic Interference

Introduction

13.3 Wind turbines can potentially interfere with communication systems that use electromagnetic waves as the transmission medium (e.g. television, radio or microwave links). Any effect depends on the turbine design and location and the fact that wind turbine rotors are not stationary. Any structure can result in the potential disruption of electromagnetic signals, either where the development creates a 'shadow' or where it gives rise to a 'reflection'.

13.4 To address this issue, the Applicant has consulted widely with all relevant organisations and system operators which could be affected by the Proposed Wind Farm Development. A summary of the comments received from consultees are shown in Table 13.1, together with details of the Applicant's own technical assessments.

Television Reception

13.5 Wind turbines have the potential to cause interference to television reception, primarily where a viewer is in the 'shadow' of and within a few kilometres of a wind farm, with their aerial pointing towards the wind farm. Viewers in such locations can have their signal 'scattered' causing loss of picture detail, loss of colour or buzz on sound. Viewers situated to one side of the wind farm may experience periodic reflections from the blades, giving rise to a delayed image or 'ghost' on the picture, which is liable to flicker as the blades rotate.

13.6 The Applicant has gained considerable experience in this area and, in practice, problems are only experienced when the receiver already has a poor signal. Specifically, if the wind farm is illuminated by the TV transmitter, problems can occur when the receiver has no line of sight to the transmitter, but has a clear line of sight to the wind farm. Generally TV interference problems are predictable and normally there is a range of solutions available. With the television signal changing to digital services this is also expected to minimise such problems.

13.7 It is also possible for a wind farm to interfere with TV rebroadcast (RBL) links or super high frequency (SHF) links that carry the TV signal between transmitters. However, such interference is predictable and is screened by the network operators. RBL and SHF TV distribution links are operated by Arqiva (formerly Arqiva and National Grid Wireless).

Consultation

13.8 For the purpose of safeguarding domestic TV reception, the UK is split up into areas for which either the BBC or the Office of Communications (Ofcom) are responsible. Arqiva is responsible for safeguarding TV RBL and SHF links in the area of the Proposed Wind Farm Development.

13.9 Arqiva has been consulted with respect to RBL and SHF links and responded to confirm both that they have responsibility for the area and also have no comment with regards to the Proposed Wind Farm Development.

13.10 Ofcom has been consulted with respect to broadcast TV. Their policy is that in the first instance developers should use the BBC online tool available on the internet[1]. If potential interference is highlighted by this tool, a more sophisticated interference assessment should be applied. This tool is no longer available on the website therefore the Applicant has undertaken an interference assessment for the Development and details are given in the following paragraphs.

13.11 The Applicant has performed a full technical assessment through prediction modelling of the scale and location of TV interference that might occur as a result of the Proposed Wind Farm Development[2]. The prediction model is based upon International Telecommunication Union (ITU) recommendations on signal propagation and impairment to television reception by wind turbines (ITU-R, 805[3] & 526-8[4]). The model is generally conservative, using a high value of signal reflectivity from the turbines, and assuming that reflections from different turbines all add in-phase to give the worst case scenario. The model has been validated using data from existing operational wind farms where TV interference was predicted prior to construction. It should be noted that the model is based on the effect on analogue signals. This therefore presents a more conservative assessment for the area around the proposed wind farm which switched over to transmitting digital signals in October 2010. Digital signals are much less susceptible to the effects of wind turbine interference than analogue; consequently any problems will be reduced.

13.12 The assessment consists of three stages. The first is an analysis of TV coverage from the transmitters in the area. The second is to predict possible interference to reception from each transmitter in turn. Finally, an assessment of practical solutions is performed based on

[1] http://www.bbc.co.uk/reception/info/windfarm_tool.shtml

[2] OfCom (The Office of Communications), August 2009, Tall structures and their impact on broadcast and other wireless services, Available Online from: http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/wind-farms/tall_structures.pdf (last accessed 10/09/2013)

[3] International Telecommunication Union / ITU Radiocommunication Sector (ITU-R), 2001. P805 Assessment of Impairment to Television Reception by a Wind Turbine.

[4] International Telecommunication Union / ITU Radiocommunication Sector (ITU-R), 2001. P526-7 Propagation by Diffraction.

the predictions of coverage and potential interference. The assessment considered the Rosemarkie, Rumster Forest, Knockmore and Grantown transmitters and covered all locations within a 10 km radius of the Proposed Wind Farm Development.

13.13 The coverage model predicted that the Rosemarkie transmitter provided good signal strength for most of the properties in the vicinity of the Proposed Wind Farm Development extending to Ferness, Urchany, Redburn, Presley and Tomdow. There were only some areas to the south west, south and south east of the Proposed Wind Farm Development that did not receive good coverage from the Rosemarkie transmitter within the study area. The Rumster Forest transmitter provided good coverage particularly to the north and east of the Proposed Wind Farm Development around Logie, Presley and Tomdow but also towards the west and south west albeit further away from the Proposed Wind Farm Development. Knockmore and Grantown only provide small pockets of coverage at the extremities of the study area and are therefore not expected to be used by the properties in the vicinity of the Proposed Wind Farm Development to receive terrestrial TV signal.

13.14 Application of the interference model showed that interference from the Rosemarkie transmitter was predicted for properties directly south towards Aitnoch, and to the north west of the Proposed Wind Farm Development towards Ferness. Properties receiving a signal from the Rumster Forest Transmitter could experience interference if located directly north of the Site towards the Mount and a small area directly south of the Proposed Wind Farm Development.

13.15 A cumulative assessment taking into account all submitted, consented and operational wind turbines greater than 50 m tip height and within 10 km of the Proposed Wind Farm Development (namely Berry Burn and Hill of Glaschyle) was completed to determine a base case of areas of interference and properties that encounter interference due to these wind farms. This allowed areas of interference, and therefore properties predicted to encounter interference solely attributable to the Proposed Wind Farm Development, to be identified.

13.16 In the assessments undertaken by the Applicant to determine the scale and location of TV interference caused by the Proposed Wind Farm Development, 25 properties in addition to those already affected in the base case described in 13.15 were identified as being affected by the Proposed Wind Farm Development. Simple solutions exist to resolve TV interference at these affected properties which are outlined in the mitigation section.

13.17 Table 13.1 provides a summary of the consultation with relevant organisations and system operators.

Table 13.1 Consultee Communication

Consultee	Issue
OfCom	Advised to consult Orange/Everything Everywhere Ltd and Airwave Solutions Ltd
Atkins	No Objection
Arqiva	No Objection
Airwaves Solutions Ltd	Links identified and turbines spaced to operator request
BT	No Objection
MLL	No Objection
Joint Radio Company (JRC)	No Objection
O2	No Objection
Orange/Everything Everywhere Ltd	Links identified and turbines spaced to operator request
T-Mobile	No Objection
Vodafone	No Objection
Cable & Wireless	Link identified and turbines spaced to operator request

Radio Reception

13.18 Reports of new structures causing problems to radio reception are rare (OfCom, 2009[1]) due to the lower frequencies used being able to pass through obstacles more readily than higher frequency TV signals.

13.19 It is therefore anticipated that radio services in the area would not be materially affected by the Proposed Wind Farm Development.

Microwave Communications

13.20 Microwave links can be affected by reflection, scattering, diffraction and blocking caused by wind turbines in their 'line of sight'. In general the directional nature of microwave links means that interference can be avoided by defining clearance zones beyond which any degradation will be insignificant. A methodology to calculate clearance zones for wind turbines has been defined in a paper published by Ofcom (Bacon, 2002).

13.21 The Applicant consulted widely with organisations and system operators, which could be affected by the Proposed Wind Farm Development. Details are listed in Table 13.1. All microwave links identified as near or passing through the Site were identified to ensure that operator defined clearances to wind turbines were adhered to.

Mitigation Measures

13.22 If the Proposed Wind Farm Development is granted consent, the Applicant would agree a scheme of assessment and mitigation with the council to be implemented expediently.

13.23 Analysis has demonstrated that up to 25 properties may suffer TV interference as a result of the Proposed Wind Farm Development. A range of viable mitigation measures is available and the most appropriate solution must be decided on a case by case, location specific basis. Solutions include:

- improved aerial system - by improved directionality, increasing aerial height, directing aerial away from or shielding from the Proposed Wind Farm Development;
- alternative transmitter – tuning the existing aerial to one of the other main transmitters in the area; and
- switching to a satellite TV service – likely to be an improvement to television service and a receiver dish can be installed if necessary.

13.24 Any necessary work would be carried out in a timely manner by the Applicant at its own expense. Given the limited extent of any predicted interference, the need for corrective action would best be identified once the scheme of assessment and mitigation has been agreed with the council and the Proposed Wind Farm Development is commissioned.

13.25 The Proposed Wind Farm Development would not have an effect on microwave or radio links as adequate clearance, as requested by the operators, has been left between turbines and microwave links identified through consultation.

Aviation

Introduction

13.26 Wind turbines can potentially interfere with aviation operations by either physically affecting the safeguarding of an aerodrome by the close proximity of the turbines or through interference with the Air Traffic Control (ATC) radars that direct aeroplanes and helicopters in flight.

13.27 The main mechanisms through which wind turbines can interfere with radars is through either reducing the sensitivity of the radar in the area around the wind farm such that aircraft are not picked up by the radar, or through wind turbines causing returns which sometimes appear on an air traffic control screen in the same way as an aircraft, causing air traffic controllers to adapt their procedures to accommodate it. The latter of these effects is commonly referred to as clutter.

13.28 The Ministry of Defence (MoD) has several other types of radar (other than ATC) and infrastructure that are safeguarded by the Defence Infrastructure Organisation (DIO).

13.29 Further information about Aviation impacts caused by wind turbines can be found in the 'Wind Energy and Aviation Interests' report (DTS 2002)[5] and the Civil Aviation Authority's CAP764 'CAA Policy and Guidelines on Wind Turbines' (CAA Jan 2012)[6], CAP168 "*Licensing of Aerodromes"* (CAA April 2011)[9] and CAP 393 "Air Navigation: The Order and the Regulations" (CAA Aug 2012)[10].

13.30 To address this issue, the Applicant has consulted widely with all relevant organisations which could be affected by the Proposed Wind Farm Development. Results of the consultations are summarised in the consultation section below.

Consultation

13.31 NATS En Route plc (NERL) supplies an air traffic service to all En Route aircraft crossing UK airspace. The Applicant has performed an assessment using published NATS self-assessment maps which are produced to allow wind farm developers to evaluate whether their turbines may have an impact on NERL infrastructure. The Proposed Wind Farm Development lies outside the safeguarding areas which identify the need for further consultation with NERL. The Proposed Wind Farm Development would therefore be of no concern to the service provider as verified by their scoping response which states they have no comments to make.

13.32 DIO (Formerly Defence Estates) was consulted in February 2013 using the protocol and pro forma agreed with Renewable UK. DIO safeguards all MoD and Met Office infrastructure that could be affected by the presence of wind turbines. In May 2013 the DIO responded stating that it has no objections to the proposal.

13.33 The DIO response also stated that the MoD requires that at least some of the wind turbines be fitted with infra-red lighting. The properties of infra-red light mean it is invisible to the naked eye, but visible to military aircraft with night vision capability.

13.34 The Applicant consulted with Highlands and Islands Airports Limited (HIAL), which operates the Air Traffic Control radar situated at Inverness Airport, regarding the Proposed Wind Farm Development in January 2013. HIAL responded with a concern regarding the Proposed Wind Farm Development. At the time of writing, HIAL and the Applicant are collaborating to address any concerns that HIAL may have as a result of the Proposed Wind Farm Development.

13.35 In the UK, the need for aviation obstruction lighting on 'tall' structures depends upon their location in relation to civil aerodromes. If the structure constitutes an 'aerodrome obstruction' it is the aerodrome operator that will assess the requirement for lighting by applying CAP 168 - Licensing of Aerodromes (CAA, 2007a). Away from aerodromes the UK Air Navigation Order (CAA, 2007b) applies, specifically Article 133 of Section 1. This requires that for en route obstructions, away from aerodromes, lighting only becomes legally mandated for structures that are 150 m or higher. However, structures of lesser height may need aviation

[5] Wind Energy and Aviation Interests, Interim Guidelines Report 2002, Available Online from : https://www.gov.uk/government/publications/wind-farms-aviation-interests-and-guidance-for-stakeholders (last accessed 09/07/2013)

6 CAA (Civil Aviation Authority), 2012. CAP 764 CAA Policy and Guidelines on Wind Turbines. Available Online from, http://www.caa.co.uk/docs/33/CAP764.pdf (last accessed 09/07/2013)

obstruction lighting if, by virtue of their location and nature, they are considered a significant navigational hazard.

13.36 The wind turbines at the Proposed Wind Farm Development will have a maximum tip height of 110 m and do not constitute an 'aerodrome obstruction'. No request for lighting from the CAA has been received during scoping.

Mitigation Measures

13.37 The Applicant will continue liaising with HIAL to resolve any concerns they may have regarding the Air Traffic Control Radar at Inverness Airport, and if proven necessary will co-operate with HIAL to identify and implement suitable mitigation.

13.38 The MoD and the relevant Air Traffic Services bodies would be notified of the construction timetable, wind turbine locations and dimensions prior to construction.

13.39 The wind turbines would be fitted with MoD approved infrared lighting in order to comply with the MoD request which resulted from the DIO consultation. The lighting will be omni-directional with an optimised flash pattern of 60 flashes per minute of 200 ms to 500 ms duration but will not be visible to the naked eye.

Shadow Flicker

Introduction

13.40 In sunny conditions, any shadow cast by a wind turbine would mirror the movement of the rotor. When the sun is high, any shadows would be confined to the Site, but when the sun sinks to a lower level above the horizon, moving shadows could be cast further afield and potentially over adjacent properties. Shadow flicker is generally not a disturbance in the open as light outdoors is reflected from all directions. The possibility of disturbance is greater for building occupants when the moving shadow is cast over an open door or window, since the light source is more directional.

13.41 Whether shadow flicker is a disturbance depends upon the observer's distance from the turbine, the direction of the dwelling from the turbine and the orientation of its windows and doors from a proposed wind farm, the frequency of the flicker and the duration of the effect, either on any one occasion or averaged over a year.

13.42 In any event and irrespective of distance from the turbines, the flickering frequency would depend upon the rate of rotation and the number of blades. It has been recommended (Clarke, 1991) that the critical frequency should not be above 2.5 Hz, which for a three bladed turbine is equivalent to a rotational speed of 50 rpm. The candidate turbines at the Proposed Wind Farm Development would rotate at approximately 18 rpm, well below this threshold.

Methodology

13.43 Using proprietary specialist modelling software, Wind Farm V4.1.2.2, an analysis of shadow flicker throughout the year from the Proposed Wind Farm Development was carried out, taking into account the behaviour of the sun, the local topography and the turbine layout and dimensions[7]. The analysis was performed using a turbine layout consisting of twenty turbines (Figure 1.2), each with maximum tip heights of up to 110 m and maximum rotor diameters of 90 m.

13.44 Government web-based Advice on Onshore Wind Turbines[8] (which replaced PAN45) gives the following information on shadow flicker:

"Where this [shadow flicker] could be a problem, developers should provide calculations to quantify the effect. In most cases however, where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem."

13.45 For the Proposed Wind Farm Development, there are no houses within 900 m (10 rotor diameters) of any proposed wind turbine. The 5 nearest properties to potential turbine locations are listed in Table 13.2 along with each properties OS grid reference, nearest potential turbine and distance from it.

Table 13.2 Location of the five nearest Residential Properties

House Number	House Name	Easting	Northing	Nearest Turbine	Distance to nearest turbine in m
2	LITTLE AITNOCH	296891	840817	T1	1165
3	KERROW FARMHOUSE	299625	841891	T6	1300
4	BRAEMORAY LODGE	299789	842834	T11	1348
28	MUCKLE LYNE	297924	845289	T20	1348
29	LITTLE LYNE	297390	845305	T20	1470

Results

13.46 As described previously, only at distances equal to or less than 900 m (10 times the maximum rotor diameter of 90 m) from a turbine has it been considered that any shadow flicker causing an impact potentially occurs. Given that the nearest property is H2, Little Aitnoch at 1165 m from T1, and no other properties exist closer to or within 900 m of a proposed turbine location, it has been concluded that the Proposed Wind Farm Development would not cause any instances of shadow flicker to the assessed receptors.

[7] 02914-000586, turbine ref 02914D0001-06, house ref 02914D0201-03

8 The Scottish Government, July 2013, http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/Onshore

Reflected Light

13.47 A related visual effect to shadow flicker is that of reflected light. Theoretically, should light be reflected off a rotating turbine blade onto an observer then a stroboscopic effect would be experienced. In practice, a number of factors limit the severity of the phenomenon and there are no known reports of reflected light being a significant problem at other wind farms.

13.48 Firstly, wind turbines have a semi-matt surface finish which means that they do not reflect light as strongly as materials such as glass or polished vehicle bodies. Secondly, due to the convex surfaces found on a turbine, light would generally be reflected in a divergent manner. Thirdly, the variability in flow within a wind farm results in slightly differing orientation of rotor directions, therefore it is unlikely that an observer would experience simultaneous reflections from a number of turbines. Fourthly, as with shadow flicker, certain weather conditions and solar positions are required before an observer would experience the phenomenon. Therefore, it is concluded that the Proposed Wind Farm Development would not cause a material reduction to amenity owing to reflected light.

Mitigation

13.49 One of the key turbine layout design constraint considerations was the minimisation of potential impacts at the nearest residential properties. As such the turbine layout was designed to ensure that there is an adequate separation distance between any of the proposed wind turbines and their nearest neighbour.

13.50 However, it is worth noting that in the unlikely event that shadow flicker at nearby neighbours needs to be addressed once the wind farm becomes operational, mitigation measures can be implemented to address this. Mitigation measures include planting tree belts between the affected dwelling and the responsible turbine(s), or installing blinds at the affected dwellings. When there is nuisance, mitigation could be to the extreme of shutting down individual turbines during periods when shadow flicker could theoretically occur.

13.51 Due to consideration in the design of the Proposed Wind Farm Development, and the adherence to government planning policy, no mitigation measures are expected to be required for the operation of the proposed turbines.

Summary

13.52 Various consultation and technical assessments have been undertaken to evaluate the impact of the Proposed Wind Farm Development on Electromagnetic Interference, Aviation and Shadow Flicker.

13.53 In the case of Electromagnetic Interference and Aviation, all relevant organisations and system operators which could be affected by the Proposed Wind Farm Development have been consulted. Their responses have been collected and technical assessments performed where necessary to inform the Proposed Wind Farm design and minimise impact on networks, infrastructure or services provided.

13.54 Detailed analysis has concluded that:

- Radio services in the area are not expected to be materially affected.
- Microwave links identified as near or passing through the Site were identified to ensure that operator defined clearances to wind turbines were adhered to.
- There is the potential for up to 25 properties to suffer TV interference as a result of the Proposed Wind Farm Development. Mitigation measures such as redirecting aerials and installing satellite TV can be implemented; thereby no detrimental impact is anticipated.

13.55 Consultation with NATS En Route plc (NERL) has concluded they would have no concern with the Proposed Wind Farm Development. Highlands and Islands Airports Limited and the Applicant are currently collaborating to resolve any concerns they may have and RES will implement any mitigation deemed necessary. The Defence Infrastructure Organisation also has no concerns with the Proposed Wind Farm Development provided the wind turbines are fitted with MoD approved infrared lighting.

13.56 Detailed analysis of shadow flicker was performed to assess the impact on local amenity. Following Government Advice for Onshore Wind Turbines, it was concluded that the Proposed Wind Farm Development would not cause any instances of shadow flicker to the receptors assessed or cause material reduction to amenity owing to reflected light.

14 Access, Traffic and Transport

Introduction

14.1 This chapter reports the findings of the assessment of access, traffic and transport effects associated with the Proposed Wind Farm Development. The purpose of this chapter is to: set out the policy context; describe the scope of the assessment; detail the proposed access, traffic and transport arrangements associated with the construction, operational and decommissioning phases; describe the current baseline traffic and route conditions; describe measures to mitigate against any identified impacts; and, to provide an assessment of the residual significant impacts of the Proposed Wind Farm Development. The main traffic and transport effects relating to the Proposed Wind Farm Development would be associated with the movements of Heavy Goods Vehicles (HGVs) during the construction period as part of the general construction traffic transporting construction material such as aggregates, cement and steel, and the movements of Abnormal Indivisible Loads (AILs) required to deliver wind turbine components. During the operational phase, it is envisaged that the amount of traffic associated with the Proposed Wind Farm Development would be minimal, although regular visits would be made for maintenance checks. The decommissioning phase would involve fewer trips on the network than the construction phase as it is possible that elements of infrastructure such as access tracks would be left in place, adding to local infrastructure (as described in **Chapter 5: Construction and Decommissioning**).

14.2 Some minor road improvements to the existing road network are required to accommodate the AILs. These improvements are discussed in paragraph 14.60 of this chapter.

14.3 Halcrow Group Limited (herein to be known as Halcrow), contracted by the Applicant, carried out an Access Study for the Site. The study was completed in a number of phases with the Phase 2 report identifying the preferred delivery route for AILs to site. The swept path drawings resulting from the final report are included in **Technical Appendix 14.1** to the Environmental Statement (ES). It is proposed that the preferred route would access the Site from the Port of Inverness as follows: A9 onto the A96 travelling east, then take the A939 from Nairn south to the Site entrance south of Ferness, via a new single priority junction. The route is shown in Figure 14.4: Abnormal Indivisible Loads Route.

14.4 The following technical appendices accompany this chapter:

- Technical Appendix 14.1 - Swept Path Assessment Drawings;
- Technical Appendix 14.2 - Visual Road Conditions Survey;
- Technical Appendix 14.3 - Structural Review;
- Technical Appendix 14.4 - Transport Assessment; and
- Technical Appendix 14.5 - Estimated Construction Programme.

Legislation and Policy Context

14.5 A review of relevant transport and planning policies has been undertaken and is summarised below. The review provides the basis for the wider development context of the Proposed Wind Farm Development.

Scottish Planning Policy

14.6 'Scotland's Transport Future', published by the Scottish Government (formerly the Scottish Executive) in June 2004 refers specifically to improving opportunities for freight, appreciating the importance for business of 'being able to transport goods efficiently and reliably' while also observing the expectation that 'the vast bulk of freight traffic would continue to be carried by road'.

14.7 Scottish Planning Policy (SPP, February 2010) supersedes SPP17.SPP is a statement of Scottish Government Policy on land use planning.

14.8 The SPP states that a Transport Assessment should be carried out where a new development is likely to result in a significant increase in the number of trips as well as identifying potential cumulative effects of development which need to be addressed. This chapter provides a summary of the full Transport Assessment undertaken in respect of the Proposed Wind Farm Development.

14.9 SPP refers specifically to the strategic transport network and its importance *"in supporting a level of national connectivity that facilitates sustainable economic growth."* SPP states that development proposals *"that have the potential to affect the performance or safety of the strategic transport network need to be appraised to determine their effects."* Providing for the safe and efficient movement of traffic on the strategic road network requires the implications of development proposals on traffic and road safety to be taken into account. SPP specifically refers to wind farm developments with reference made to the potential constraint of site access. SPP also refers to haulage of minerals. It states that *"where there are significant transport impacts on local communities routes which avoid settlements as far as possible should be identified*."

14.10 In considering cumulative impacts, Planning Authorities should take account of existing wind farms, those which have permission and valid applications for wind farms that have not been determined. Within areas of search where there are no significant constraints on development, SPP notes that sites may be constrained by a number of issues, including site access arrangements.

HITRANS Regional Transport Strategy

14.11 The Highlands and Islands Transport Partnership (HITRANS) Regional Transport Strategy (RTS) states that its primary objective is *"to improve the interconnectivity of the whole region to*

strategic services and destinations in order to enable the region to compete and support growth." It further states that the strategy's overarching policy *"is to develop a fit for purpose, multi-modal transport system."*

14.12 The RTS outlines 10 horizontal themes where it intends to focus action and investment during the 15 year term of the strategy. The themes relevant to this development are:

- development of a programme of investment to improve and maintain the locally significant rural road network which has suffered from under-investment in the past;
- preparation of a strategy for investment in ports and ferries;
- development of initiatives for reducing the cost of transport and travel; and
- development of ways to reduce and mitigate the climate change impact of travelling in, to and from the region.

The Highland-wide Local Development Plan (HwLDP)

14.13 The HwLDP deals with both strategic as well as local planning matters. Policy 28 states that, *"The THC will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland."*

14.14 Policy 28 goes on to state that proposed developments will be assessed on the extent to which they impact on approved routes for road and rail links.

14.15 Policy 67 states that the THC will pay particular attention to any significant effects on land and water based traffic and transport interests.

The Highland THC Local Transport Strategy

14.16 The Local Transport Strategy (LTS) provides a direction for transport in the Highlands and the strategy *"would guide policy and investment on transport within Highland THC"* for the period 2011 to 2014. The LTS characterises the rural road network as *"winding single carriageway roads with passing places."* The Highland Council (hereafter to be known as THC) manages a large number of bridges and has developed the 'Lifeline Bridges Programme' which *"would invest in bridges to maintain access, remove weight restrictions or reduce the weight restriction effect of HGV vehicles."* The Lifeline Bridge programme is designed to ensure that heavy goods are able to continue to effectively move around the network and this is important for potential AIL movements throughout the area.

14.17 The LTS vision states that it seeks to *"enable and facilitate sustainable development and economic growth"*, with the objective that it would provide a transport network to enable sustainable economic growth.

THC Interim Supplementary Guidance: Onshore Wind Energy

14.18 THC produced the Interim Supplementary Guidance: Onshore Wind Energy document in March 2012. This states that *"the THC expects that further onshore wind energy development of all types and sizes would be required as part of that in order to meet targets."*

14.19 The document states that any wind energy development must demonstrate that the development and associated infrastructure would not have a significant adverse effect on the public road network. Applicants would be required to enter into a section 96 (Roads Scotland Act) agreement with the THC to address damage to public roads. It is not proposed that any materials or HGV's related to the Proposed Wind Farm Development will utilise the local road network in Moray Council area.

Issues Identified during Consultation

14.20 SBA undertook scoping discussions with THC to ascertain their requirements for the Transport Assessment (TA). SBA also invited Transport Scotland (TS) to comment as trunk roads authority through their term agents, JMP Consultants. Additional scoping responses have been included from our consultees received as part of the wider ES scoping exercise.

14.21 A summary of consultation responses is provided in Table 14.1, which details where and how this is addressed within this chapter.

Table 14.1: Issues Identified during Consultation

Consultee	Issue	Where / How this is Addressed
THC	Traffic data should be collected over at least one full calendar week and the counts should be undertaken during school term times, preferably in August.	Surveys undertaken 31/08/12. Summary of results provided throughout this chapter.
	The TA should include a framework Construction Traffic Management Plan.	Included in **Technical Appendix 14.4**
	Traffic and noise and vibration issues have in the past been expressed by residents of properties situated near to the A939 at Househill.	Impact on A939 considered. Addressed at paragraph 14.113.
	Depending on the outcome of swept path assessments a trial run for an AIL movement, undertaken in liaison with the Police and the roads authorities, may be required.	AIL Assessment Swept Path Drawings Included in **Technical Appendix 14.1**.
	Establish current condition of the roads.	Addressed as part of the Visual Road Condition Survey found in **Technical Appendix 14.2.**
	Assess impact of proposed traffic on carriageway, structures, verges etc., impact on other road users, adjacent communities and complete swept path analysis and gradient analysis where it is envisaged that passage of traffic could be problematic.	Swept Path Assessment in **Technical Appendix 14.1**. Structure Review report in **Technical Appendix 14.3**.
Transport Scotland (TS)	If trip generation potential is significant then there may be a requirement for a Transport Assessment / Statement but this is unlikely due to the distance of the development from the trunk road network	As shown in Table 4.20 trip generation on the trunk road is negligible.

Table 14.1: Issues Identified during Consultation

Consultee	Issue	Where / How this is Addressed
	It is expected that information would be provided on the wider impact of development related traffic where this may be appropriate together with the requirements for consequent mitigation.	Addressed at paragraph 14.96
	Identify potential environmental impacts on the trunk road once the development is operational, together with any required mitigation measures.	As stated in paragraph 14.57 the volume of development related traffic would be minimal with occasional visits for maintenance checks which would likely use LGVs. Therefore the operational effects are not considered in this chapter.
	Potential trunk road related environmental impacts such as noise, air quality, safety etc. should be assessed where appropriate.	Please refer to Table 14.22 which summarises any environmental impacts of potential road widening.
	In the case of the Environmental Statement the methods should comprise the determination of the baseline traffic and transportation conditions, and the sensitivity of the site and existence of any receptors likely to be affected in proximity of the trunk road network; a review of the development proposals to determine the predicted construction and operational requirements; and an assessment of the significance of predicted impacts from these transport requirements, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.	These are considered throughout this chapter. Residual effects have been assessed post mitigation. Paragraphs 14.124.
	Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report that work that has been undertaken (e.g. Transportation / Noise / Air Quality Assessments etc.), what this has shown (i.e. what impact if any has been identified) and why it is not significant.	Please refer to Table 14.22.
	It is not necessary to include all the information gathered during the assessment of these impacts, although this information should be available, if requested. It is noted that it may be possible to scope out some of the above requirements by presenting more information with regard to the trip generation potential of the development and the anticipated number of vehicle movements on the trunk road network.	Please refer to Table 14.22.

Table 14.1: Issues Identified during Consultation

Consultee	Issue	Where / How this is Addressed
Moray Council (MC)	It is noted that the only access to the site will be from the A939 and that delivery of turbine components including AILs will use roads within THC only. Further (pre-application) consultation with MC's Transportation Manager is required regarding any part of the proposal which will access and / or utilise the road network system through Moray.	There will be a negligible impact as it is not predicted that any construction traffic will use the B9007 or A940 in Moray. Whilst some construction traffic may originate within Moray this will access the Site via the trunk road network.
Edinkillie Community Association	The impact on roads and road users to and from this area will cause disruption and structural damage not only to the roads and tracks but also to the local road users transport	Addressed as part of the Visual Road Condition Survey found in **Technical Appendix 14.2**. See 'Road Maintenance' section of this chapter, paragraph 14.68.
	A report on the roads intended for access route should be made, as destruction of local natural habitats and disturbance to wildlife cannot be replaced.	Addressed as part of the Visual Road Condition Survey found in **Technical Appendix 14.2**. See also Table 14.22.
	The local metallised roads are not designed for heavy use and become pot holed (that are not filled in for weeks on end) and crumble as they cannot withstand the weighty, high usage as created by accessing with the turbine parts.	Addressed as part of the Visual Road Condition Survey found in **Technical Appendix 14.2**. See 'Road Maintenance' section of this chapter, paragraph 14.68.
	If the wind farm gets the go ahead, then road repair should be reviewed weekly and mended weekly. Tarmac all widening of metalized roads and provide ample passing places for two wide load lorries to pass each other. It is not funny meeting them on route and causes great disruption and disquiet.	See 'Road Maintenance' section of this chapter, paragraph 14.68.
Grantown-on-Spey & Vicinity Community Council	We are also very concerned at the likelihood of severe traffic disruption on the A939, our main road access to and from Nairn, especially at the turnoff from the A96, and at the Findhorn Bridge, Ferness.	A full traffic assessment has been completed as part of this study with result found throughout this chapter. Mitigation measures have been detailed to ensure that the potential effect on traffic is minimal as shown in paragraph 14.61 etc.

Assessment Methodology

Baseline Characterisation

14.22 The baseline review focuses on the nature of the surrounding road infrastructure and the level of traffic that uses it. It has been informed by desktop studies and consultation, comprising the following:

- review of responses to the scoping report;
- collection of traffic flow data;
- review of any roads hierarchy promoted in relevant Local Transport Strategies;
- identification of sensitive junction locations;
- identification of constraints to the roads network, with or without height / width / weight restrictions;
- identification of areas of road safety concerns;
- identification of other traffic sensitive receptors in the area (routes, communities, buildings etc.); and
- review of Ordnance Survey (OS) plans to derive a local area roads network.

Study Area

14.23 The study area for the traffic and transport assessment is shown in Figure 14.1. Based on consultation with THC it has been defined as beginning on the A96 immediately west and east of the A939 junction and continuing south along the A939 to its junction with the A940. This definition is confirmed using the IEMA rules outlined in paragraph 14.32 Figure 14.3 shows the Construction Traffic Routes.

14.24 Please note that this does not include the full extent of the AIL route which has been assessed separately and a summary can be found in paragraph 14.60.

14.25 The A939 Nairn to Grantown-on-Spey road passes along the western boundary of the Site.

Field Survey

14.26 Field surveys have also been undertaken to further enhance the understanding of the road network in the study area, and to identify potential constraints on the network, this included:

- visual inspection of all roads identified in the study area network;
- photographic / video record of any constraints; and
- traffic counts to determine existing traffic flows on the surrounding road network.

14.27 As part of the scoping consultation, three survey sites were identified that would allow an accurate estimate of the potential impact of the construction phase to be made. To gauge the existing usage, Automatic Traffic Count (ATC) surveys were commissioned at the following locations:

- A96 east of its junction with the A939;
- A96 west of its junction with the A939; and
- A939 south of its junction with the B9007.

14.28 The locations of the traffic counts are illustrated in Figure 14.2

14.29 As agreed with THC, the count data was collected for one week during school term times from 31st August 2012 by independent traffic survey specialists, Streetwise Services.

Method of Assessment

14.30 The assessment has been undertaken in accordance with the 'Guidelines for Environmental Effect Assessment' produced by the Institute of Environmental Management and Assessment (IEMA). These guidelines express that the separate 'Guidelines for the Environmental Assessment of Road Traffic' should be used to characterise the environmental traffic and transport effects (off-site effects) and the assessment of significance of major new developments. The guidelines intend to complement professional judgement and the experience of trained assessors.

14.31 The perception of changes in traffic is dependent upon a wide range of factors including its volume, speeds, function and its composition (e.g. percentage of heavy goods vehicles). Therefore, the assessment of the environmental effects of traffic requires a number of stages, namely:

- determination of existing and forecast traffic levels and characteristics;
- determining the time period suitable for assessment;
- determining the year of assessment; and
- identifying the geographical boundaries of assessment.

14.32 The following rules, taken from the 'Guidelines for the Environmental Assessment of Road Traffic', have been used as a screening process to define the geographical boundaries (see Figure 14.1) of this assessment:

- Rule 1 – include highway links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- Rule 2 – include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

14.33 Predicted volumes of vehicle movements associated with the construction phase have been prepared and these are used to provide an assessment of the likely impact of construction vehicles on the surrounding road network.

14.34 The assessment presents the potential effects of construction traffic, and identifies those which are likely to be significant.

Significance Criteria

14.35 Having identified which environmental impacts are to be considered, and the highway links which need to be included within the analysis, the next stage of the assessment is to quantify

the magnitude of the environmental impact and to identify the level of significance that such changes have made. This requires the definition of both base-line conditions and estimation of conditions for the appropriate year of assessment. Each receptor will have a different value and level of sensitivity to change. Quantification of environmental impacts is easier for some receptors than others. Table 14.2 provides descriptions of receptor sensitivity based on DMRB guidelines HA 205/08 'Assessment and Magnitude of Environmental Effects'.

14.36 For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, corroborated by data or quantified information where possible.

Table 14.2: Receptor Sensitivity

Sensitivity	Description
High	Typically receptors with high importance and rarity on an international and national scale and with limited potential for substitution. To include large rural settlements containing a high number of community and public services and facilities, areas with traffic control signals, waiting and loading restrictions, traffic calming measures and minor rural roads, not constructed to accommodate frequent use by HGV.
Medium	Typically receptors with high or medium importance and rarity on a regional scale and with limited potential for substitution. To include intermediate sized rural settlements containing some community or public facilities and services, areas with some traffic calming or traffic management measures and local A or B class roads, capable of regular use by HGV traffic.
Low	Typically receptors with low or medium importance and rarity on a local scale (on-site or neighbouring the site). To include small rural settlements with few community or public facilities or services, areas with little or no traffic calming or traffic management measures and trunk or A-class roads, constructed to accommodate significant HGV composition.
Negligible	Typically receptors with little importance and rarity. To include roads with no adjacent settlements including new strategic trunk roads or motorways that would be little effected by additional traffic and suitable for AILs.

Magnitude of Effect

14.37 The IEMA guidelines[1] identify general thresholds for traffic flow increases of 10% and 30% as discussed in paragraph 14.32. The guidelines also suggest that 30%, 60% and 90% changes in traffic levels should be considered as *"slight, moderate and substantial"* impacts respectively with regard to severance and intimidation. It is also generally considered that traffic flow increases of less than 10% are negligible, given that daily variation in background traffic flow may vary by this amount. Based on these guidelines and perceptions, the magnitude of the effect can be estimated for the traffic-based effects using the criteria in Table 14.3.

Table 14.3: Effects Magnitude

High	Medium	Low	Negligible
>90% increase in traffic	60% - 90% increase in traffic	30% - 60% increase in traffic	0% - 30% increase in traffic

Significance of Effect

14.38 To determine the overall significance of the effects, the results from the receptor sensitivity and effect magnitude classifications are correlated and classified using the scale summarised in Table 14.4.

Table 14.4: Matrix for Determination of Significance of Effect

Magnitude / Sensitivity	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

14.39 For the purposes of assessing significant effects, under the EIA regulations, this matrix provides a guide subject to professional judgement. For example, the introduction of a low number of additional HGV movements on a route that is currently subject to low numbers of HGV trips is recorded as being highly statistically significant, even though the numbers of additional trips could be just five to ten additional vehicles. Despite the fact that additional traffic volumes may be exceptionally low, the effect may be statistically high. However, it is not necessarily significant in terms of the EIA regulations. Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of equal to or greater than moderate significance.

Baseline Conditions

Context

14.40 The Site is located within Nairnshire in the Scottish Highlands. The Site (Figure 14.3) is located approximately 17 km south east of Nairn and 15.5 km north of Grantown-on-Spey, travelling by road, and is generally bounded to the west by the A939 and to the north, east and south by farmland. The Site would be accessed from a single access junction from the A939 which leads from Nairn to Grantown-on-Spey.

[1] Institute of Environmental Management and Assessment (IEMA, 1993) – Guidelines for the Environmental Assessment of Road Traffic.

14.41 The Site is accessed via the A939, located south of the A96 corridor and is therefore well placed to utilise the high grade links, appreciating that HGV traffic should seek to make use of strategic routes where possible.

14.42 THC Core Paths mapping does not identify any existing Core Paths on the Site or in the study area.

Current Baseline

14.43 As described in paragraph 14.30, the traffic counters used allowed the traffic flows to be split into vehicle classes as well as into overall directional traffic volume. The vehicle classes reported in the survey are as follows:

- Car and lights – this classification covers cars, light goods vehicles (up to 3.5 tonne), cars with trailers / caravans;
- Other Goods Vehicles – Class 1 (OGV1) & buses; this classification generally covers smaller commercial vehicles between 3.5 and 7.5 tonnes and includes rigid 2 and 3 axle trucks and articulated trucks up to 3 axles, as well as buses and coaches; and
- Other Goods Vehicles – Class 2 (OGV2); this classification covers all heavy goods vehicles with 4 or more axles.

14.44 Tables 14.5 and 14.6 summarise the weekday and Saturday traffic data collected at the three sites, which are shown in Figure 14.2.

Table 14.5: Existing Traffic Conditions (Weekday Average Two-Way Flows)

Survey Location		Cars + Lights	OGV1	OGV2	%HGV	Total
A96 east of A939 junction	12 Hour Flow	10219	1294	217	13	11730
	24 hour Flow	12240	1567	288	13	14095
A96 west of A939 junction	12 Hour Flow	11643	1440	214	12	13297
	24 hour Flow	14043	1723	274	12	16040
A939 south of B9007 junction	12 Hour Flow	320	45	15	16	380
	24 hour Flow	356	50	15	15	421

Table 14.6: Existing Traffic Conditions (Saturday Two-Way Flows)

Survey Location		Cars + Lights	OGV1	OGV2	%HGV	Total
A96 east of A939 junction	12 Hour Flow	9788	714	64	1	10566
	24 hour Flow	11772	917	91	1	12780
A96 west of A939 junction	12 Hour Flow	11168	777	72	1	12017
	24 hour Flow	13452	992	103	1	14547
A939 south of B9007 junction	12 Hour Flow	441	36	1	0	478
	24 hour Flow	485	43	1	0	529

Speed Survey

14.45 The ATC sites used to collect the traffic volume and composition data were also used to collect speed statistics for each of the sites. The 5-day average and 85th percentile speeds observed at the count locations are summarised below in Table 14.7.

Table 14.7: Speed Summary

	Average Speed (MPH)	85th Percentile Speed (MPH)	Speed Limit (MPH)
A96 east of A939 junction	28	33	30
A96 west of A939 junction	26	33	30
A939 south of B9007 junction	55	66	60

Accident History

14.46 Road traffic accident data was obtained for the four years from the start of 2008 to the end of 2011 for the A939.

14.47 Tables 14.8 to 14.13 summarise the 2008-2011 accident data by severity, time of day, weather conditions and road surface conditions.

Table 14.8: Accident Severity Summary

Year	Slight	Serious
2008	1	
2009		1
2010	1	
2011	2	

Table 14.9: Accident Times

Time	No. Incidents
0900-1600	1
1600-1800	4

Table 14.10: Weather Conditions

Weather	No. Incidents
Fine without high winds	3
Other	2

Table 14.11: Road Surface Conditions	
Road Conditions	**No. Incidents**
Dry	4
Frost / Ice	1

Table 14.12: Vehicles Involved	
Vehicles Involved	**No. Incidents**
Motorcycle over 50cc and up to 125cc	1
Motorcycle over 500cc	2
Car only	2
Car	1

Table 14.13: Comparison			
Vehicles Involved	**Weather Conditions**	**Road Conditions**	**Severity of Accident**
Motorcycle over 500cc	Other	Dry	Slight
Motorcycle over 500cc	Fine without high winds	Dry	Serious
Car & Motorcycle over 50cc and up to 125cc	Fine without high winds	Dry	Slight
Car only	Fine without high winds	Dry	Slight
Car only	Other	Frost or Ice	Slight

Future Baseline

14.48 Construction of the project is predicted to be completed in 2018[2]. For the purpose of this assessment, a 28 month construction period has been assumed (see **Technical Appendix 14.5**).

14.49 Any lengthening in the programme however would have a reduced impact on the surrounding road network in terms of the daily intensity of tripst.

14.50 To assess the likely impacts during the construction phase, base year traffic flows have been assessed by applying the National Road Traffic Forecast (NRTF) high growth factors to the 2012 surveyed traffic flows as agreed with THC during scoping. Applying high growth factors provides a robust assessment as they represent higher than average growth. This approach was agreed by THC.

[2] Should the construction of the project be completed in a later year, the per centage change in traffic levels due to the construction traffic associated with the Proposed Wind Farm Development would actually be less than for 2018, due to annual growth in background traffic levels.

14.51 The NRTF high growth factor is 1.1053 when looking to the predicted year of completion. This factor has been applied to the 2012 survey data to estimate the 2018 traffic flows, as shown in Table 14.14 and 14.15.

14.52 No committed developments were identified by THC to be included in the assessment.

Table 14.14: 2018 Base Traffic Conditions (Weekday Average Two-Way Flows)						
Survey Location		**Cars + Lights**	**OGV1**	**OGV2**	**%HGV**	**Total**
A96 east of A939 junction	12 Hour Flow	11295	1430	240	13	12966
	24 hour Flow	13529	1732	318	13	15579
A96 west of A939 junction	12 Hour Flow	12869	1592	237	12	14697
	24 hour Flow	15522	1904	303	12	17729
A939 south of B9007 junction	12 Hour Flow	354	50	17	16	420
	24 hour Flow	393	55	17	15	465

Table 14.15: 2018 Base Traffic Conditions (Saturday Two-Way Flows)						
Survey Location		**Cars + Lights**	**OGV1**	**OGV2**	**%HGV**	**Total**
A96 east of A939 junction	10819	789	71	7	11679	10819
	13012	1014	101	8	14126	13012
A96 west of A939 junction	12344	859	80	7	13282	12344
	14868	1096	114	8	16079	14868
A939 south of B9007 junction	487	40	1	8	528	487
	536	48	1	8	585	536

Potential Impacts

Potential Construction and Decommissioning Impacts

14.53 Potential traffic and transport impacts associated with the Proposed Wind Farm Development would be related to traffic movements during the construction period. During construction, vehicles would access the Site transporting construction staff, construction materials (aggregates, cement, steel bar etc.), plant items and turbine components. The decommissioning phase would involve fewer trips on the network than the construction phase as elements of infrastructure such as foundations, and potentially access tracks, would be left in place.

14.54 This chapter considers the following potential effects:

- **Severance** – in this case, the perceived division occurring within a community, i.e. the difficulty of crossing the road, which may result from the temporary increase in traffic during the construction period;

- **Driver delay** – traffic delays to non-development traffic may occur at several points on the network surrounding a site including at the site entrance, on the highways passing a site, at other key intersections and at side roads (where the ability to find gaps in the traffic may be reduced, thereby lengthening delays);
- **Pedestrian delay** – changes in the volume, composition or speed of traffic may affect the ability of people to cross roads and, in general, increasing traffic levels are likely to lead to greater increases in delay depending upon the general level of pedestrian activity, visibility and general physical conditions of the site;
- **Pedestrian amenity** – broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/ separation from traffic; and
- **Accidents and safety** – the determination of impacts which may elevate or lessen the risks of accidents, e.g. junction conflicts.

Potential Operational Impacts

14.55 Significant effects related to traffic movements during the operational phase are unlikely to arise. The traffic generated once operational would be associated mainly with service and maintenance trips using mainly 4x4 type vehicles with potentially occasional HGV movements to access the Site for heavier maintenance and repairs.

14.56 During operation of the Proposed Wind Farm Development, Site roads would be well maintained and monitored and road cleaners would be available to remove material carried onto public roads by any maintenance traffic travelling from the Site.

14.57 Occasional AIL movement associated with the delivery of replacement components may be required; however any AIL movements would be planned in liaison with the relevant authorities.

Potential Decommissioning Impacts

14.58 With regard to the decommissioning phase, no separate consideration of possible decommissioning impacts has been included as part of this assessment. At the end of the Proposed Wind Farm Development's operational life, there may be an impact on the local highway network due to the movements of HGVs associated with the removal of equipment and materials. However, the number of vehicle movements is anticipated to be lower than that predicted for construction (i.e. the construction phase represents the 'worst case') and any baseline data collected for the purposes of this assessment would not be relevant so far in the future.

Mitigation

Mitigation by Design

Improvements Required for All Traffic

14.59 The new Site entrance on the A939 would be designed to accommodate all classes of construction traffic (see Figure 4.6).

General Modifications Required for the Delivery of AIL Components

14.60 The following substantive remedial works were identified as part of the Swept Path Assessment (referred to in paragraph 14.3) to accommodate the predicted AIL movements. Please refer to Figure 1.3: Road Widening Boundary and **Technical Appendix 14.1: Swept Path Assessment**:

- Widening 1: A96 / A939 Junction (Detail D in **Technical Appendix 14.1**) - the tracking assessment illustrates approximately 87 m^2 of widening required to accommodate the anticipated vehicles with approximately 77 m^2 of vehicle / load oversail beyond this, all within Transport Scotland land to the north east of the A96 on approach to the junction. The estimated widening / oversail avoids impacting on the bridge structure. The safe movement of the vehicles / loads will require the temporary removal / relocation of adjacent signs and traffic signal infrastructure, north of the A96. It is advised that the existing footway be relocated for the duration of the transport movements, with a temporary footway installed and reinstatement to the existing situation afterwards. Widening beyond the road edge on the eastern side of the A939 is required with vehicle / load oversail extending beyond this, all within the adjacent footway and verge. The safe movement of the anticipated vehicles / loads will avoid impacting on the adjacent traffic signal infrastructure but will require the temporary removal of adjacent guardrail. Utilities are present at this location which may require protection or potentially diversion; and,
- Widening 2: A939 Approach to Logie Bridge (Detail M in **Technical Appendix 14.1**) - the assessment has been completed to avoid any impact on the bridge structure. Approximately 59 m^2 of highways widening works, 80 m^2 of third-party widening works, 4 m^2 of vehicle / load oversail within the adjacent verge and approximately 31 m^2 of vehicle / load oversail into third-party land will be required. Excavation and reinforcement of the adjacent land is required and vegetation will need to be removed. The widening works also allow the vehicles / loads to avoid an impact on adjacent street furniture i.e. signs and traffic signal infrastructure. AIL delivery vehicles will use both sides of the carriageway. Utilities are present at this location which may require protection or potentially diversion.

14.61 A summary of the environmental effects of these road improvements is presented in Table 14.22. There will be other minor improvements including e.g. slight widening, temporary fence removal and tree trimming within the Highways verge at various points along the route, as depicted in full in **Technical Appendix 14.1: Swept Path Assessment**. These improvements are summarised at paragraph 14.117.

14.62 AIL mitigation works can be designed to be temporary in nature to enable restoration of the road to its original condition (if required by THC). Areas of widening must be usable for the lifetime of the wind farm, although they can be re-vegetated following construction.

Route Selection

14.63 The primary mitigation measure to help minimise the effects of general construction traffic is the careful consideration of the roads network to identify a preferred route or routes to and from the development access junction. A detailed review of the physical road characteristics of potential routes was carried out to assess their suitability as potential delivery routes for both AILs and construction vehicles. This assessment took into account the location of potentially sensitive receptors.

14.64 The initial route selection process identified delivery via the A939 from the north as the principal access route with a new access to be created directly onto the A939.

14.65 On completion of road works required for the AILs, local traffic users would benefit from road safety improvements, such as the widening of road sections.

Mitigation during Construction

Road Maintenance

14.66 THC may require an agreement under section 96 of The Roads (Scotland) Act 1984, a standard condition, to cover the cost of abnormal wear and tear on roads not designed for that purpose.

14.67 Video footage of the pre-construction phase condition of the AIL access route and the construction vehicles route would be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline would enable any repairs and maintenance work along the road network to be carried out, which may result from the passing of heavy vehicles associated with the proposed wind farm construction. The road network would be returned to at least the baseline condition at the end of the construction phase. Any damage caused by wind farm traffic during the construction period that would be hazardous to public traffic would be repaired as soon as reasonably practicable.

14.68 Road improvements would be carried out, in agreement with Transport Scotland, BEAR Scotland, THC and the appropriate statutory authorities to ensure minimal damage to road surfaces, verges, street furniture and surrounding vegetation. Damage to road infrastructure caused directly by construction traffic would be made good, and street furniture that is removed on a temporary basis would be fully reinstated. Potential impacts on landscape and visual amenity, ecology, noise, archaeology and hydrology have been considered in the individual chapters and summarised in Table 14.22.

14.69 SBA has undertaken a high level road conditions survey of the route pre-planning to ensure that an accurate account of the existing conditions is retained. The survey was carried out on the 19th April 2013 by video survey with defects recorded generally in line with HD29/08[3]. Detail of the findings of this report can be found in **Technical Appendix 14.2 - Road Conditions Survey Report**.

14.70 SBA has completed a structural review of the following bridges that THC has identified for further inspection;

- Logie Bridge – Certified as suitable for proposed loads;
- Belivat Culvert - Certified as suitable for proposed loads;
- Redburn Bridge - Certified as suitable for proposed loads;
- Little Mill - Certified as suitable for proposed loads; and
- Blar an Dualt - Certified as suitable for proposed loads.

14.71 Full details can be found in the Structures Review found in **Technical Appendix 14.3**.

Traffic Management Measures

14.72 During the construction period the Applicant and contractor would maintain a website containing the latest information relating to traffic movements associated with vehicles accessing the Site, in agreement with the local roads authority, THC.

14.73 The following commitments are made in terms of site operation and maintenance during the construction phase:

- all materials delivery lorries (dry materials) would be sheeted to reduce dust and stop spillage on public roads;
- specific training and disciplinary measures would be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway; and
- wheel wash facilities would be established at the site entrance to prevent mud and dust being brought out from the Site onto the public highway.

14.74 A Construction and Decommissioning Method Statement (CDMS) (see **Technical Appendix 5.1**) would set out measures to be put in place to reduce the impact of noise, dust and excessive speed. The CDMS would also include a requirement to maintain access to existing paths within the Site or to make alternative provision to avoid severance.

14.75 Vehicles would be fitted with identification numbers to allow the public to identify any vehicles that may be speeding or causing specific issues and drivers would be required to pass through sensitive areas at low speed.

14.76 An AIL Traffic Management Plan (TMP) would also be developed to ensure road safety for all road users during transit of development loads. The TMP would outline measures for managing the convoy and set out procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. This is normally undertaken by informing the emergency services of delivery times and dates and agreeing communication protocols and lay-over areas to allow overtaking.

14.77 The TMP would be developed in consultation with the police, local community and highways authorities and agreed before deliveries to the site commence.

[3] Design Manual for Roads and Bridges Volume 7 Section 3, HD29/08, Part 2 – Data for Pavement Assessment

14.78 The AIL transports would be escorted by a number of vehicles, potentially including a police escort to assist a civilian escort car on specific sections of the route. It is proposed that an advance escort would warn oncoming vehicles ahead of the convoy, with the other escorts staying with the convoy at all times. The escorts and convoy should remain in radio contact at all times where possible.

14.79 The transit of AILs along areas of restricted geometry should be undertaken as a rolling closure to reduce the level of disruption to local traffic and residents. Subject to trunk road licensing conditions and police requirements, it is likely that the convoys would travel in the early morning periods, before peak times.

14.80 Advance warning signs are recommended to be installed on the approaches to the affected road network. Temporary signage advising drivers that AILs would be operating is recommended along the route.

14.81 Signage such as this would help improve driver information and alert drivers of oncoming traffic, thereby allowing them to consider whether proceeding to the nearest convenient passing bay, or breaking their journey until the convoy has moved on, would be appropriate.

14.82 To further improve drivers' information, it is suggested that the Variable Message Signs (VMS) operated by the Transport Scotland are used to warn drivers of AILs operating on the trunk road sections of the route. The signs could also warn drivers of possible delays and to allow them to consider alternative routes.

14.83 Additionally, information on the movement of AIL convoys could be provided to local media outlets to help assist the public. These could include:

- local newspapers;
- local radio stations;
- Applicant website; and
- THC website.

14.84 Information would relate to expected vehicle movements on the A939 through to the site access. It is intended that this level of information would make residents aware of convoy movements and help reduce any potential conflicts.

Traffic Permitting

14.85 Appropriate permits would be obtained in order to facilitate the transportation of AILs at specified times to be agreed with the Roads Authority and local community. Likewise, appropriate permits would be obtained in order to facilitate the temporary removal of street furniture (e.g. signage) where this may be required during the transportation of AILs either from the port of entry or from the relevant UK manufacturing facility.

Assessment of Residual Impacts

Introduction

14.86 This section considers the level of sensitivity of the local road network, to the increase in vehicle movements associated with the construction phase, and to the off-site route improvements required for the AILs.

14.87 The assessment is based upon the following assumptions:

- all stone is assumed to be imported;
- concrete would be ready mixed and imported to the Site – total volume of concrete required is anticipated to be approximately 7,727 m^3, which equates to 1,288 Mixer Trucks (2,576 movements);
- sand would imported to site – total volume of sand required is anticipated to be 4,800m^3, which equates to 408 Tipper Trucks (816 movements);
- construction traffic requirements are as quantified in **Technical Appendix 14.5**;
- due to the nature of materials and plant required on Site, the majority of vehicles utilised will be HGV;
- the construction programme is estimated to be 28 months, with construction deliveries phased in accordance with **Technical Appendix 14.5**; and
- assumes 30 vehicles average per day for construction employees / staff, over a 6 day week, for 28 month construction period.

14.88 Of the construction and decommissioning phases, the greatest traffic volumes are associated with the project construction phase. The decommissioning phase involves fewer trips on the network than the construction phase as elements of infrastructure such as access tracks are often left in place, adding to local infrastructure.

14.89 The worst case transport scenario is therefore the construction phase and the following quantitative assessment of traffic effects concentrates on that element of the project's life. It should be borne in mind however that the construction impacts are temporary in nature and short lived.

Derivation of Development Traffic

14.90 During the 28 month construction period, the following traffic would require access to the Site:

- staff transport, either cars or staff minibuses;
- construction equipment and materials, deliveries of machinery and supplies such as cement;
- AILs consisting of the wind turbine sections and also a heavy lift crane; and
- AIL escort vehicles.

14.91 The estimated construction traffic movements associated with the Proposed Wind Farm Development have been provided by the Applicant, and are summarised in **Technical Appendix 14.5**.

Total Peak Development Traffic Flows

14.92 A standard construction programme for a 20 turbine site was used to convert the total

movements for each trip type to average monthly traffic flows. To enable comparison of the estimated 2018 baseline traffic flows with total volumes including predicted construction traffic, the monthly data was converted to average daily flows for each month and the peak period for construction traffic determined. The final construction profile is included as **Technical Appendix 14.5**.

14.93 The maximum traffic impact associated with construction of the Proposed Wind Farm Development is predicted to occur in month nine of the programme. During this month, an average of 96 HGV movements are predicted per day and it is estimated that there would be a further 48 car and light van movements per day to transport construction workers to and from the Site.

Development Traffic Distribution

14.94 The distribution of development trips on the network would vary depending on the types of loads being transported. Figure 14.3 outlines where it is considered construction traffic will approach the Site from.

14.95 During the construction phase of the Site entrance from the A939 HGVs and other lorries will approach the Site from the north.

14.96 It is assumed that staff trips will approach the Site from both Grantown-on-Spey in the south and Nairn in the north (50% from Nairn / the north and 50% from the south).

14.97 More specialist deliveries have different distributions on the network. The distributions for these estimated trips were based on the following assumptions:

- all AILs will originate from the Port of Inverness and ultimately access the site via the A9, A96 and A939 – the route is indicated in Figure 14.4;
- crane trips will access the site via the A9, A96 and A939;
- all track aggregate material will be sourced from local quarries. There are a number of quarries located throughout the area, generally to the north and west of the Site. These vehicles would be routed via the Trunk Road network and access the site from the A96 west (80%) and A96 east (20%) onto the A939 approaching from the north;
- all concrete deliveries will be sourced from local ready mix sites. There are a number of sites located throughout the area, generally to the north and west of the Site. These vehicles would be routed via the Trunk Road network and access the Site from the A96 west (80%) and A96 east (20%) onto the A939 approaching from the north; and
- all other deliveries are assumed to route equally via the A96 and approach the Site along the A939 from the north.

Traffic Impact

14.98 The 2018 future year traffic data was combined with the peak daily construction traffic flows to estimate the total trips on the study network during the peak of the construction phase. This was then distributed across the network.

14.99 Table 14.16 illustrates the peak weekday and Saturday construction traffic flow assuming all track construction material is imported; Table 14.17 and Table 14.18 the weekday & Saturday 2018 Base plus peak construction traffic (Total) flows and Table 14.19 and Table 14.20 the weekday and Saturday percentage increase in 2018 Total traffic over 2018 Base traffic.

Table 14.16: Weekday & Saturday Construction Traffic

Survey Location		Cars + Lights	OGV1	OGV2	Total
A96 east of A939 junction	12 Hour Flow	12	5	14	31
	24 hour Flow	12	5	14	31
A96 west of A939 junction	12 Hour Flow	12	21	55	88
	24 hour Flow	12	21	55	88
A939 south of B9007 junction	12 Hour Flow	24	27	68	119
	24 hour Flow	24	27	68	119

Table 14.17: 2018 Total Weekday Traffic Flows (Base + Construction)

Survey Location		Cars + Lights	OGV1	OGV2	%HGV	Total
A96 east of A939 junction	12 Hour Flow	11307	1435	254	13	12997
	24 hour Flow	13541	1737	332	13	15610
A96 west of A939 junction	12 Hour Flow	12881	1613	292	13	14785
	24 hour Flow	15534	1925	358	13	17817
A939 south of B9007 junction	12 Hour Flow	378	77	85	30	539
	24 hour Flow	417	82	85	29	584

Table 14.18: 2018 Total Saturday Traffic Flows (Base + Construction)

Survey Location		Cars + Lights	OGV1	OGV2	%HGV	Total
A96 east of A939 junction	12 Hour Flow	10831	794	85	8	11710
	24 hour Flow	13024	1019	115	8	14157
A96 west of A939 junction	12 Hour Flow	12356	880	135	8	13370
	24 hour Flow	14880	1117	169	8	16167
A939 south of B9007 junction	12 Hour Flow	511	67	69	21	647
	24 hour Flow	560	75	69	20	704

Table 14.19: Percentage Increase 2018 Weekday Total vs. Base Traffic Flows						
Survey Location		**Cars + Lights**	**OGV1**	**OGV2**	**%HGV**	**Total**
A96 east of A939 junction	12 Hour Flow	0.1%	0.3%	5.8%	0.9%	0.2%
	24 hour Flow	0.1%	0.3%	4.4%	0.7%	0.2%
A96 west of A939 junction	12 Hour Flow	0.1%	1.3%	23.3%	3.5%	0.6%
	24 hour Flow	0.1%	1.1%	18.2%	2.9%	0.5%
A939 south of B9007 junction	12 Hour Flow	6.8%	54.3%	410.1%	89.5%	28.3%
	24 hour Flow	6.1%	48.9%	410.1%	84.9%	25.6%

Table 14.20: Percentage Increase 2018 Saturday Total vs. Base Traffic Flows						
Survey Location		**Cars + Lights**	**OGV1**	**OGV2**	**%HGV**	**Total**
A96 east of A939 junction	12 Hour Flow	0.1%	0.6%	19.8%	1.9%	0.3%
	24 hour Flow	0.1%	0.5%	13.9%	1.5%	0.2%
A96 west of A939 junction	12 Hour Flow	0.1%	2.4%	69.1%	7.4%	0.7%
	24 hour Flow	0.1%	1.9%	48.3%	5.7%	0.5%
A939 south of B9007 junction	12 Hour Flow	4.9%	67.9%	6152.2%	171.2%	22.5%
	24 hour Flow	4.5%	56.8%	6152.2%	145.4%	20.4%

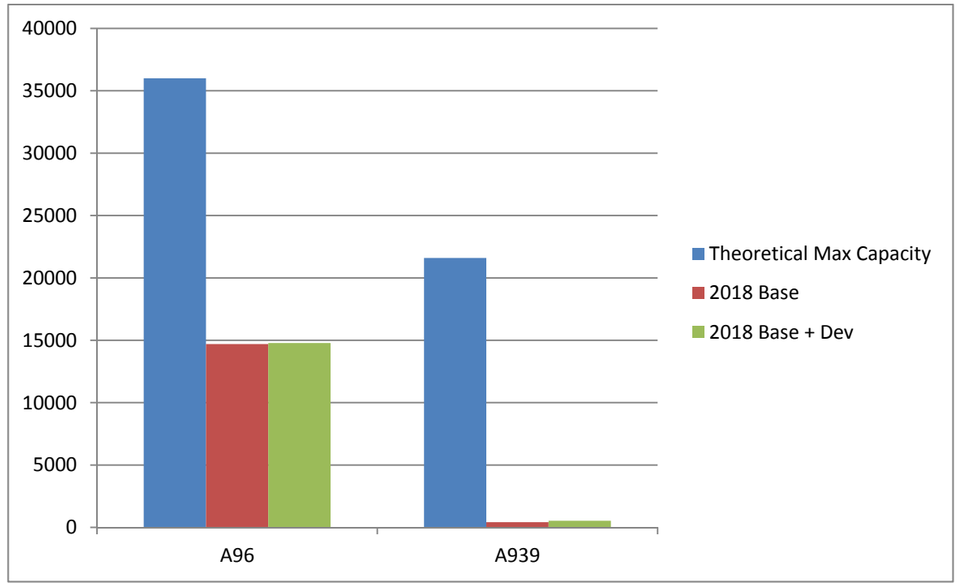
Future Base + Construction Link Capacity

14.100 The average link capacities for the various links within the study area have been estimated using the NESA Manual, Chapter 3[4]. The theoretical capacities are detailed below:

- A96 – between 19,200 and 36,000 vehicles per 12 hours; and
- A939 - 21,600 vehicles per 12 hours

14.101 A comparison of the theoretical capacity versus the estimated '2018 Future Year Traffic Base Traffic Flow + Construction Phase Trips' 12-hour flows for the links in the network is illustrated in Graph 14.1.

Graph 14.1: Link Capacity Profile



14.102 The impact review was undertaken for weekday conditions as this represents the worst case in load movements. The results indicate that the greatest impact of construction traffic will be on the A939 between Nairn and the Site. However, this reflects the low number of trips on these sections of the road network. The comparison of development traffic flows with theoretical link capacities indicates that there is very significant spare capacity on the local road network and no link capacity issues associated with the construction traffic would be anticipated.

14.103 With reference to the IEMA guidelines, total traffic flows are not predicted to increase by more than 30% on any links. However, the A939 is considered to be a critical link due to the predicted uplift in HGV traffic.

14.104 HGV traffic levels are projected to increase on the A939 on a weekday and Saturday. The percentage increase is highest on the A939 though existing traffic and specifically HGV flows are very low on this link. The actual number of additional HGV movements per day is considered relatively low, even assuming that all track material is imported.

14.105 The weekday and Saturday impact on the network is the focus of the environmental assessment.

14.106 A route evaluation has been carried out for this route against the key environmental criteria. Table 14.21 summarises the potential impact of the increase in traffic on different environmental receptors identified in the IEMA Guidance.

14.107 The impacts of statistical significance are restricted to the local road network. No impacts on the trunk road network are considered significant enough to warrant further assessment as

[4] Design Manual for Roads and Bridges Volume 15 Section 1 – The NESA Manual

the percentage increase in total traffic is less than 30% as outlined in Table 14.19 and 14.20.

Receptor Sensitivity

14.108 Although a small number of settlements lie within the vicinity of the access route along the A939, none lie directly on the route and as such are not deemed to be sensitive receptors.

14.109 Consideration has been given to the existing condition and ability of the A939 to accommodate HGV traffic. The receptor sensitivity of the A939 has been assessed to be low/ negligible.

14.110 As detailed in Table 14.1, THC stated in response to the scoping request that "*...concerns regarding traffic noise and vibration have in the past been expressed by residents of properties situated alongside the A939 at Househill"*.

14.111 THC has introduced a number of measures to address residents' general concerns including localised carriageway repairs and road markings and signage to generally improve road safety.

14.112 Noise and vibration are functions of the speed and weight of a vehicle and the number of such vehicles passing a specific point. It is proposed that at specific sensitive areas (as defined by Rule 2), all construction traffic would have a speed limit applied through the various contracts used to engage those working on the Site. This speed limit would be checked and rigorously applied by the Applicant as part of their commitment to having a considerate construction period. For the Proposed Wind Farm Development this would be applied to Househill.

14.113 DMRB[5] recognises that a change in noise level of 1dB (A) is the minimum change that can be detected in the human ear. In the short term this equates to an increase in traffic of around 25%. Elsewhere[6], it has been found that where road noise gradually increases on an existing road a 3 dB (A) change is recognised as the smallest change in noise that is readily perceptible. This equates to an approximate 100% increase in road traffic. Given that the maximum increase in construction traffic is 28.3% potential noise impacts associated with construction traffic are not considered further.

14.114 The A939 at Househill is located on the main Nairn to Grantown-on-Spey road. This is a district distributor A Class road and as such has no restrictions on the number of HGVs using the route. As such, noise levels and vibration caused by HGV traffic are already experienced on a daily basis and cannot be restricted. The proposal to have a speed limit in this section for construction traffic to prevent the heavy braking and acceleration currently experienced will significantly aid the reduction of this potential impact to the point where it is not considered significant.

14.115 The A939 passes near to Ferness which is a small village set back from the A939. The impact on the village as a receptor is considered to be negligible due to the location of households which are set back from the A939.

Effects Magnitude and Effects Significance

14.116 The impacts listed below are recommended by the IEMA guidelines[7] to be potentially important when assessing the traffic effects from an individual development, and have been considered:

- severance – the Manual of Environmental Appraisal (MEA) sets out a range of indicators for determining the significance of the relief from severance: changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively;
- driver delay – these delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system;
- pedestrian delay – the delay to pedestrians, as with driver delay, is likely only to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system;
- pedestrian amenity – the MEA suggests that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled;
- fear and intimidation – there are no commonly agreed thresholds for estimating levels of danger, or fear and intimidation, from known traffic and physical conditions; and
- accidents and safety – professional judgement will be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents.

Table 14.21: A939 Critical Link Review

Potential Effect	Receptor Sensitivity	Magnitude of Effects	Significance of Effect	Comment
Severance	Low	Low	Negligible	Based in the two way average daily percentage increase in construction traffic shown in Table 14.20, the severance impact is estimated to be negligible along the route. The draft Construction and Decommissioning Method Statement will be used to minimise the severance impact of vehicles along the A939. Measures such as numbering of all construction vehicles will be instigated and strict adherence to speed limits will be required by all vehicles. Drivers will be fully briefed to ensure that they are aware of pedestrian and cycle crossings along the route. As outlined in para 14.80 AIL movements will be fully escorted and movements will be controlled using a detailed Traffic Management Plan.

[5] Design Manual for Roads and Bridges 2008, Volume 11: Section 3, Part 7 Noise and Vibration

[6] IOA/IEMA Working Party 2002, Draft Guidelines for Noise Impact Assessment

[7] Institute of Environmental Management and Assessment – Guidelines for the Environmental Assessment of Road Traffic

Table 14.21: A939 Critical Link Review				
Potential Effect	**Receptor Sensitivity**	**Magnitude of Effects**	**Significance of Effect**	**Comment**
Driver Delay	Low	Low	Negligible	It is envisaged that driver delay would largely only occur during the movement of the AILs which are limited in number and only occur over a short period within the construction programme. Details of AIL movement times will be placed in the local press and wind farm website along with signage along the route to allow other users to avoid the route during planned movements thus minimising the impact of driver delay.
Pedestrian Delay	Low	Low	Negligible	Due to the rural nature of the route there are extremely limited pedestrian facilities or local attractions to encourage walking in the area. There are no local paths near to the Site. Pedestrian delay is therefore unlikely to be an issue.
Pedestrian Amenity	Low	Low	Negligible	Due to the rural nature of the route there are extremely limited pedestrian facilities or local attractions to encourage walking in the area. There are no local paths near to the Site. Pedestrian amenity is therefore unlikely to be an issue.
Accidents and Safety	Low	Low	Negligible	There is limited potential for impact on safety due to driver frustration, particularly with regards to the transport of the AILs as loads will be fully escorted at all times.

All Route Improvements

14.117 The movement of AILs will also have an effect on the road network; the swept path assessment (**Technical Appendix 14.1**) identified a number of constraints along the route and the drawings illustrate the extent of potential road improvements at these locations. It is anticipated that the road widenings would be subject to a condition of the Section 36 consent and that the Applicant would agree the detailed design and delivery of the road improvements post Section 36 Consent, in consultation with THC.

- Longman Roundabout (Detail A) – loads will oversail the south eastern pavement on the inside of the left entry into the roundabout;
- Inverness Airport (Detail B) – loads will oversail the northern pavement of the approach arm and the northern edge of the roundabout island;
- King Street / Ninian Road Roundabout (Detail C)– loads will overrun the approach arm splitter island and oversail the southern pavement on the inside of the right turn movement;
- A96 / A939 Junction (Detail D)– loads will overrun and oversail the north eastern verge of the A96 and the south eastern verge of the A939 on exit from the junction. Loads will also oversail the western verge on the inside of the right turn movement;
- A939 Househill Left Bend (Detail E)– loads will overrun and oversail the western verge on approach to the left bend. Loads will also oversail the inside of the left bend;
- A939 Right Bend South of Househill (Detail F) – loads will overrun and oversail the eastern verge on approach to the bend and oversail the inside of the right bend;
- A939 Right Bend Laiken Brae (Detail G) – loads will oversail the south western verge on the inside of the right bend;
- A939 Left Bend North of Tomshogle (Detail H) – loads will overrun and oversail the north eastern verge on the inside of the left bend;
- A939 Right Bend North of Tomshogle (Detail I)– loads will oversail the south western verge on the inside of the right bend;
- A939 Right Bend Newton of Belivat (Detail J) – loads will oversail the outside of the bend into the north eastern verge;
- A939 Right Bend North of Logie Bridge (Detail K) – loads will overrun and oversail the eastern verge on the outside of the right bend;
- A939 West of Cairnglass (Detail L)– loads will oversail into the south western verge on the inside of the right bend;
- A939 Logie Bridge (Detail M)– loads will overrun and oversail into the south western verge on approach to the bridge;
- A939 South of Logie Bridge (Detail N)– loads will overrun and oversail the southern verge on the inside of the right bend; and
- A939 Site Access.

14.118 Two of the above locations (Detail D and Detail M which require substantive road widenings) have been identified as requiring specific assessment in relation to landscape, visual amenity, ecology, ornithology, hydrology, cultural heritage and noise. These are referred to as Widening 1 (Detail D) and Widening 2 (Detail M). An assessment of potential impact at these locations is included in Table 14.22 below.

Table 14.22: Summary of Predicted Environmental Effects of AIL Route Improvements		
Environmental Impact Type	**Road-widening location**	**Summary of Predicted Environmental Effects**
Landscape	Widening 1: A96/A939 junction	Temporary removal of street furniture will not have significant landscape impacts. Earthworks to the east side of the A939 will be carried out to grass verges and banks with a slight reduction in the area of flat grass with trees by the junction. With proposed restoration works, it is not considered that these works give rise to significant residual landscape effects.
	Widening 2: Logie Bridge Approach	Earthworks to the west side of the road just north of Logie Bridge will involve removal of a grassy bank with immature hedgerow trees on it. Although localised impacts will occur, it is not considered that these would be significant. Residual impacts would be further reduced by replanting of similar species trees along the realigned top of the bank.
Visual Amenity	Widening 1: A96/A939 junction	Views in the immediate vicinity of the junction will include the temporary works. With proposed restoration works, it is not considered that these works give rise to significant residual visual effects.
	Widening 2: Logie Bridge Approach	Views in the immediate vicinity of the bridge will include the temporary works. With proposed restoration works, it is not considered that these works give rise to significant residual visual effects.
Archaeology and Cultural Heritage	Widening 1: A96/A939 junction	No Effect.
	Widening 2: Logie Bridge Approach	Minor significance direct effect on retaining wall (removal and replacement in set back position) - a high magnitude impact on feature of lesser importance. Possible minor significance direct effect - medium magnitude impact on site of local importance - on any surviving, buried remains of former cottage (of early 19th century date - depicted on Ordnance Survey 1st (1871) and 2nd (1905) edition maps) to west of retaining wall resulting from ground reducing earthworks. Minor effect on setting of Category A listed Logie Bridge, Ferness (Over River Findhorn) (HBNUM 564), designed by Thomas Telford and completed in 1816, as a result of re-alignment of road to west side of bridge.
Hydrology, Hydrogeology and Flood Risk	Widening 1: A96/A939 junction	Widening 1 is located outside the flood plain of the River Nairn and the proposed road-widening is not thought to impact upon the hydrology of this location. Therefore, no effect is anticipated.
	Widening 2: Logie Bridge Approach	Widening 2 is located in very close proximity to the River Findhorn at Logie Bridge, within the flood risk area of the River Findhorn. The proposed works include replacement of a retaining wall in a set back position to support the bank, although no in-stream works are proposed. As detailed within **Chapter 11: Geology, Hydrology and Hydrogeology**, the River Findhorn is designated for the presence of salmonids and the waterbody has an overall status of Good water quality. Due to the proximity of works to the River Findhorn, the primary construction impacts are the temporary potential for reductions in water quality through sedimentation and changes to in-stream hydrochemistry. These arise from the necessary ground disturbance resulting in an increased sediment supply and the potential mobilisation of this sediment, resulting in wash off into the stream network and subsequent increased in-stream concentrations. Finally the potential temporary impacts also include the potential for the pollution of watercourses as a consequence of accidental spillage of chemicals, hydrocarbons and other construction materials. The mitigation measures during construction, specifically the runoff and sediment control measures are presented within **Chapter 11: Geology, Hydrology and Hydrogeology** and should be adhered to. The residual impact is considered to be not significant.
Ecology and Ornithology	Widening 1: A96/A939 junction	There are no effects associated with these improvements.
	Widening 2: Logie Bridge Approach	Tree removal is planned at Widening 2 and this area was subject to bat surveys to check for occupancy by roosting bats. No bats were found and thus effects in this regard are discounted. As described above, there is the risk of effects upon the River Findhorn as a result of the construction works, which have the potential to reduce water quality and impact upon fish populations here. The mitigation measures during construction, specifically the runoff and sediment control measures are presented within **Chapter 11: Geology, Hydrology and Hydrogeology** and should be adhered to. The residual impact is considered to be not significant.
Noise	Widening 1: A96/A939 junction	Predicted noise levels from the combined effect of increased traffic flows and activities associated with peak construction of the wind farm are below the 65 dB(A) daytime target level specified by BS 5228-1:2009 at all locations. Assessment of construction and traffic noise is presented within Chapter 12: Noise.
	Widening 2: Logie Bridge Approach	Predicted noise levels from the combined effect of increased traffic flows and activities associated with peak construction of the wind farm are below the 65 dB(A) daytime target level specified by BS 5228-1:2009 at all locations. Assessment of construction and traffic noise is presented within Chapter 12: Noise.

Cumulatives

14.119 THC and Transport Scotland did not provide details of any other schemes that should be taken into account as part of the access, traffic and transport impact assessment.

14.120 Transport Assessments only require to take into account 'consented' schemes. Of those identified as part of the project cumulative assessment, only one has the potential to impact on this scheme, Cluny Farm turbine. As the scheme is for a single Enercon E33 turbine which has a very limited requirement for transport related movements, this has been accounted for by using high NRTF and as such no further assessment was undertaken.

Summary

14.121 This chapter has assessed the likely significance of effects of the traffic associated with the Proposed Wind Farm Development during the construction phase. Based on existing traffic data, the estimated volume of construction traffic, the methodology outlined, the implementation of mitigation measures such as an appropriate traffic management plan and suitable liaison with the relevant authorities, an assessment of the residual effect has been made.

Residual Impacts

14.122 Based on existing traffic data, the estimated volume of construction traffic, the methodology outlined in this chapter and considering the potential impacts, an assessment of the residual impacts has been made. The residual traffic and transport effects are temporary and have been assessed below in Table 14.23 as having negligible impacts.

Table 14.23: Residual Construction Traffic Impacts

Likely Significant Effects	Mitigation Proposed	Means of Implementation	Outcome / Residual Effects
Severance	Measures such as numbering of all construction vehicles will be instigated and strict adherence to speed limits will be required by all vehicles. Drivers will be fully briefed to ensure that they are aware of pedestrian and cycle crossings along the route. As outlined in para 14.80 AIL movements will be fully escorted	Traffic Management Plan and Construction and Decommissioning Method Statement	No significant residual effects anticipated
Driver Delay	Details of AIL movement times will be placed in the local press and wind farm website along with signage along the route to allow other users to avoid the route during planned movements thus minimising the impact of driver delay.	Traffic Management Plan	No significant residual effects anticipated

Table 14.23: Residual Construction Traffic Impacts

Likely Significant Effects	Mitigation Proposed	Means of Implementation	Outcome / Residual Effects
Accidents and Safety	Measures such as numbering of all construction vehicles will be instigated and strict adherence to speed limits will be required by all vehicles. Drivers will be fully briefed to ensure that they are aware of pedestrian and cycle crossings along the route. All AIL movements will be fully escorted.	Traffic Management Plan and Construction and Decommissioning Method Statement	No significant residual effects anticipated

15 Socio Economics

Introduction

15.1 This chapter considers the potential socio-economic impacts and likely significant effects of the construction, operation and decommissioning of the Proposed Wind Farm Development on the local population, national and regional economy; and, on local tourism and recreational users. The key objectives of the assessment are to:

- describe the baseline socio-economic environment at both the regional and national scale;
- describe the local tourism and recreation baseline;
- describe the likely potential effects, as a result of the proposed wind farm, both during construction and once complete;
- describe any mitigation measures that are required in order to avoid, or reduce potential adverse effects, and/or enhance any beneficial effects; and
- assess the significance of residual effects.

15.2 This chapter is supported by the following Technical Appendices:

- Technical Appendix 15.1: Access Management Plan; and
- Technical Appendix 15.2: Case Study of Meikle Carewe Wind Farm.

Legislation and Policy Context

National Legislation and Policy

National Tourism Strategy

15.3 The aspirations of the Scottish Tourism Strategy are set out in the National Tourism Strategy[1] which was published in June 2012. The National Tourism Strategy supersedes the Highland Tourism Partnership Plan which was agreed in 2006 by the Highland Tourism Partnership. The Strategy identifies tourism as one of Scotland's "*key economic contributors*" with a total spend close to £11 billion in 2011. It also contains growth forecasts that suggest that the tourism industry has the potential to increase visitor spending by £1 billion by 2020.

15.4 In order to achieve this target, the Strategy identifies the need to focus on developing Scotland's tourism assets to meet and exceed visitor expectations, increase spend and increase the number of visits. Among the assets identified are nature, heritage and activities, which incorporate activities such as wildlife-watching, hill-walking and sailing, country sports, farm stays and visiting castles as well as adventure sports. The Strategy also highlights a need to promote more widely destination towns and cities, events and festivals and business tourism.

15.5 The Strategy identifies five priorities for action, one of which is 'Building sustainable tourism' – economic, environmental and social.

Land Reform (Scotland) Act 2003

15.6 Part 1 of the Land Reform (Scotland) Act[2] provides a statutory right of access (a right to roam) to most land and inland water for recreation, education and going from place to place, providing they act responsibly, by respecting people's privacy, safety and livelihoods, and Scotland's environment. Equally, land managers must manage their land and water responsibly in relation to access rights.

Scottish Outdoor Access Code

15.7 The Scottish Outdoor Access Code provides detailed guidance on the responsibilities of those exercising access rights and of those managing land and water. The Code is based on the following three principles, which apply equally to the public and to recreation and land managers:

- respect the interests of other people;
- care for the environment; and
- take responsibility for your own actions.

Regional and Local Policy

Highland-wide Local Development Plan (2012)

15.8 The Highland-wide Local Development Plan (HwLDP)[3] was adopted by THC on 5 April 2012 and sets out the overarching vision statement, spatial strategy and general planning policies for the Highland Council area. Key actions for improvement identified within the HwLDP and relevant to this chapter include:

- create sustainable Highland communities;
- support a competitive, sustainable and adaptable Highland economy; and
- improve opportunities for all, and create a fairer society.

15.9 Key activities identified in the HwLDP to support a competitive, sustainable and adaptable Highland economy include providing opportunities which encourage economic development and create new employment across key sectors, including renewable energy and tourism, amongst others; and promoting the development of tourism.

15.10 The HwLDP sets out a strategy for a diverse economy, including a vision for ports and harbours, including Inverness and Invergordon to support the growth of tourist and renewables related economic development.

[1]Scottish Tourism Alliance (June 2012), Tourism Scotland 2020: The Future of the Industry in our Hands.

[2]Scottish Government, 2003. Land Reform (Scotland) Act 2003

3The Highland Council, (2012). Highland-Wide Local Development Plan April 2012

Interim Supplementary Guidance: Onshore Wind Energy (2012)

15.11 This planning policy guidance covers onshore wind energy development in the Highlands and supplements the HwLDP.

15.12 The guidance states that in giving consideration to positive or negative effects that a proposal may be likely to have on the local and national economy, THC will have regard to a range of considerations which may include but not be limited to:

- the scale and nature of any potential economic spin-offs for local businesses, employment opportunities, etc. arising from the proposals (evidence for this may be available as an output from discussions on community benefit, which are carried out separately from planning matters);
- effects on industries for which Highland's landscape is important – for example tourism and recreation;
- effects on industries such as forestry brought about through changes to land use and management.

The Highland Council Core Paths Plan

15.13 THC adopted its Core Paths Plan in September 2011, in accordance with the requirements of the Land Reform (Scotland) Act 2003. The Plan comprises a series of maps showing core paths present in the following areas:

- Ross and Cromarty Area;
- Inverness and Nairn Area;
- Skye and Lochalsh Area;
- Lochaber Area; and
- Caithness Area.

15.14 Core Paths aim to satisfy the basic needs of local people and visitors for general access and recreation and aim to provide links to the wider path network throughout the THC area. These paths are close to where people live and can range from tracks worn into natural ground to high-specification constructed paths.

Moray Local Plan (2008)

15.15 The Moray Local Plan 2008[4] replaced the Moray Local Plan 2000, and will remain in force for five years, when it will again be reviewed. The Plan interprets the strategic direction provided by the Moray Structure Plan 2007[5] into detailed policies and proposals for use in the determining of planning policies.

15.16 Of particular relevance to this assessment is Chapter 3: Development & Community of the Local Plan, which discusses economic development and community facilities in the Moray Council authority area and Chapter 4: Environment & Resources, which provides a framework to optimise the benefits of the natural resources to the area.

15.17 Policies of particular relevance to this assessment include:

- Policy CF3: Countryside Recreation: Access and Trails - which aims to protect environmentally sensitive areas and existing or planned public outdoor access routes; and
- Policy 'ER1: Renewable Energy Proposals' which provides a range of criteria to consider renewable energy applications against. One such criterion is whether renewable energy proposals 'are compatible with tourism/recreational interest and facilities'.

Moray Onshore Wind Energy Supplementary Planning Policy Guidance, 2013

15.18 The Moray Onshore Wind Energy Supplementary Planning Policy Guidance[6] was developed to be a material consideration in assessing wind turbine proposals.

15.19 The Guidance states that Developers should ensure 'that visual and landscape assessments take account of key viewpoints which may be used by tourists and local people, this includes, landmark hills and viewpoints, Core paths, cycleways, bridleways, visitor centres, the Spey Valley and distilleries'.

15.20 The Guidance also indicates proposals should take account of:

- key outdoor tourism areas such as Spey Bay, Findhorn Bay, Ben Rinnes, the Speyside Way, Bin of Cullen, Ben Aigan, Moray Coast Trail, Dava Way, Moray's forests, the Glenlivet Estate, the Isla Way and key visitor centre attractions;
- how they intend to manage walkers, cyclists and horse riders, exercising access rights in the vicinity of wind turbines; and
- safeguarding distances from all public paths to ensure public safety in the event of a structural failure.

Moray Council Core Paths Plan

15.21 Moray Council adopted its Core Paths Plan in June 2011, to meet the statutory requirement for a Core Paths Plan under the Land Reform (Scotland) Act 2003. The Plan comprises a series of overview maps showing Core Paths present in the following areas:

- North East Moray;
- North West Moray; and
- South Moray.

Cairngorms National Park Local Plan (2010)

15.22 The Cairngorms National Park Local Plan was adopted in 2010 and relevant policies are described below:

- Policy 36: Other Open Space Provision – this aims to promote developments which improve or add to current levels of public and amenity open space, and to restrict developments which would result in a loss of existing provision.

[4] Moray Council (2008) Moray Local Plan
5 Moray Council (April 2007) Moray Structure Plan

[6] The Moray Council, 2013. Moray Onshore Wind Energy Supplementary Planning Policy Guidance

Cairngorms National Park Partnership Plan 2012-2017

15.23 The Cairngorms National Park Partnership Plan sets out the vision and overarching strategy for managing the Park, providing focus and priorities as well as a strategic context for the Local Development Plan, and it shows how the four aims of the National Park can be achieved together, benefiting people and place. The four aims of Scotland's national parks are as follows:

- to conserve and enhance the natural and cultural heritage of the area;
- to promote sustainable use of the natural resources of the area;
- to promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public; and
- to promote sustainable economic and social development of the area's communities.

Issues Identified During Consultation

15.24 Table 15.1 below summarises issues relating to socio-economics, recreation and tourism identified during consultation.

Table 15.1 Issues Identified during Consultation

Consultee	Issue	Where/How this is addressed
The Highland Council (THC)	The ES should estimate who may be affected by the development, including individual households, local communities or a wider socio economic groupings such as tourists & tourist related businesses, recreational groups, economically active, etc.	This chapter provides an assessment of potential impacts on local/regional businesses, tourism and recreational facilities. Impacts are summarised in Table 15.7. Reference may also be made to other technical chapters within the ES including: Chapter 7: Landscape and Visual; Chapter 10: Cultural Heritage and Archaeology; Chapter 11: Geology, Hydrology and Hydrogeology; Chapter 12: Noise; Chapter 13: Electromagnetic Interference, Aviation and Shadow Flicker; and Chapter 14: Access, Traffic and Transport.
	Recognise community assets that are currently in operation, e.g. road network, footpaths, TV, radio, telecommunication links, radar, aviation interests, tourist routes etc.	This chapter assess potential impacts on footpaths and tourist routes and impacts are summarised in Table 15.7. **Chapter 14: Access, Traffic and Transport** deals with the existing road network and **Chapter 13: Electromagnetic interference, aviation and shadow flicker** reports on potential impacts

Table 15.1 Issues Identified during Consultation

Consultee	Issue	Where/How this is addressed
		associated with telecommunication links, TV, radio, radar and aviation.
	An assessment should be provided of the proposal's impact on outdoor access in line with SNH guidance. While there may be no public rights of way, core paths or publicised routes on the site it is subject to the broader access rights conferred by the Land Reform (Scotland) Act 2003. Not far outside the redline boundary are many more elements of outdoor access that may well be affected by this proposal. Those elements should include not only the features in our area [The Highland Council] but also those of our neighbours Moray Council and the Cairngorms National Park Authority.	An Access Management Plan has been prepared in accordance with SNH guidance and is presented as a technical appendix to this chapter. This chapter assesses potential impacts on outdoor access and recreation in the THC area, as well as parts of Moray and the Cairngorms National Park.
	An access management plan demonstrating how the Applicant intends to manage access before, during and after construction should be submitted with the application, addressing how the proposals will accommodate different types of access (walkers, cyclists and horse riders).	An Access Management Plan has been prepared in accordance with SNH guidance and is presented as Technical Appendix 15.1 of this ES.
British Horse Society (BHS)	BHS advised that the site and surroundings are well used by both visiting and local horse riders. There are a couple of equestrian tourism businesses in the area so the Proposed Wind Farm Development should be equestrian friendly. All tracks should be preserved as multi-use, access controls should be made horse friendly and all surfaces should be suitable and equestrian access should be improved where possible.	As described in **Chapter 5: Construction and Decommissioning**, all on-site tracks would remain for the lifespan of the Proposed Wind Farm Development. Details of proposed access at the Site are provided in Technical Appendix 15.1: Access Management Plan.
Cairngorms National Park Authority	Socioeconomics chapter should consider impacts in relation to the four aims of the National Park which are linked to economic and social issues as set in the National Park Partnership Plan.	This chapter considers impacts in relation to the four aims of the National park, as detailed in paragraph 15.21. Impacts are summarised in Table 15.7.
Edinkillie Community Association	ECA advised that potential visual impacts may affect their community area, A940 and Dava Way including tourism in the area. These impacts might have a cumulative effect on the area, since other cumulative developments adjoin the Site.	Potential impacts on recreation and tourism are discussed in this chapter, under Residual Operational Impacts.
Scotways	The Society highlighted a number of public rights of way and other opportunities for recreation and access in the vicinity of the Site. The Applicant should also consult the Core Paths Plans, prepared by Local Authorities.	Impacts on public rights of way and Core Paths are assessed in this chapter, under Residual Impacts

Assessment Methodology

Baseline Characterisation

Study Area

15.25 The study area used for the identification and evaluation of baseline conditions and potential impacts with regard to socio-economic factors is defined as the THC and Moray Council local authority areas. For the purposes of identifying socio-economic conditions, it is considered that data for THC and Moray would also be representative of conditions within the Cairngorms National Park. For comparison, baseline conditions and potential impacts are also considered for Scotland as a whole. Where possible, reference has also been made to socio-economic baseline at ward level; the Site is located in the Nairn ward.

15.26 A smaller study area, representing a 15 km radius area, surrounding the Site is used for the tourism and recreation assessment. This represents the maximum area over which recreational receptors are considered most likely to experience significant effects, in terms of landscape and visual amenity, as a result of the Proposed Wind Farm Development. This provides more locally-specific assessments of the potential effects and reflects the area where the Proposed Wind Farm Development is most likely to impact on tourism and recreation activities.

Data Sources

15.27 Baseline socio-economic conditions have been identified through desk-based review of key socio-economic data sources (provided through the Office for National Statistics), as well as background strategy and policy documentation.

15.28 The description of baseline conditions for access and recreation has been completed with reference to a range of publically available data sources including the following:

- Visit Highlands, Moray regional website;
- THC and Moray Council Core Paths Plans;
- OS 1: 50,000 scale mapping;
- Visit Scotland website; and
- Sustrans website.

Method of Assessment

15.29 The economic effects expected to arise as a result of the construction, operation and decommissioning of the Proposed Wind Farm Development have been informed by the guidance in Her Majesty's Treasury's 'Green Book for Economic Appraisal and Evaluation'[7], and good practice guidance for economic assessment used by both the Scottish Government and Scottish Enterprise. The potential for the Proposed Wind Farm Development to result in significant effects has been defined by combining the sensitivity of the receptor with the magnitude of the change.

15.30 There are no established guidelines to inform the assessment of tourism and recreation effects of wind farms either in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 or other statutory guidance on the preparation of EIA. The tourism impact assessment component generally follows the widely accepted industry standard set out in the recommendations of the 2008 research[8] for the Scottish Government. Outdoor access is considered with reference to the guidance contained within Appendix 5 of Scottish Natural Heritage's publication[9]. A review of practice from other wind farm socio-economic assessments has additionally been used to value the features identified, based on available information and informed by consultation and desk study. The assessment of direct impact on physical access will be drawn from any changes to the existing access arrangements during the construction and operation of the Proposed Wind Farm Development. The assessment of impact on wider leisure/tourism businesses will draw on the Landscape and Visual assessment (Chapter 7), the Noise assessment (Chapter 12) and the Access, Traffic and Transportation assessment (Chapter 14) to identify potential impacts and assess likely effects on tourism and recreation. In addition, effects will be assessed with reference to various externally produced reports on the potential effect of wind farms on tourism in Scotland, the UK and further afield[10].

15.31 Key receptors for the socio-economic assessment, assessed for the construction and for the operational phase comprise the following:

- Local and national labour market;
- Local and national businesses; and
- Tourists, visitors and recreational users

Significance Criteria

15.32 There are no standard significance criteria for socio-economic or tourism and recreation effects, nor is there any benchmark against which the scale of predicted effects can be compared. Therefore the following significance criteria have been developed through: consideration of the baseline conditions; consultations (as summarised in Table 15.1); and evidence from research into the tourism and recreation effects of wind farms, presented later in this chapter.

15.33 In order to assess the significance of each of the effects discussed in this chapter, it is first necessary to assess the magnitude of the change considered in terms of both scale and duration. This is done with reference to the current baseline conditions. The magnitude

[7] HM Treasury, 2003. Green Book for Economic Appraisal and Evaluation, 2003 (and amendments made in Discussion Paper written by Fujiwara and Campbel 2011)

[8] Scottish Government (2008) The economic impacts of wind farms on Scottish tourism http://www.scotland.gov.uk/Publications/2008/03/07113554/0

[9] 'SNH (2006) A Handbook on Environmental Impact Assessment'

[10] This includes reference to the following reports: Glasgow Caledonian University (2008).The Economic Impact of Wind Farms on Scottish Tourism, a report to the Scottish Government; VisitScotland Insight Department (August 2012). Wind Farm consumer research topic paper; and Scottish Parliament Economy, Energy and Tourism Committee (November 2012) Report on the achievability of the Scottish Government's renewable energy targets, 7th Report 2012 (session 4).

criteria used in this assessment, for both the socio-economic and the tourism and recreation elements, are presented below:

- High: changes that are likely to result in major, long term alteration of baseline conditions or fundamentally alter the character of the local economy/tourism sector/community;
- Medium: changes that are likely to result in major short-term or material long-term change in baseline conditions but are not expected to fundamentally alter the character of the local economy/tourism and recreation sector/ community;
- Low: changes that are likely to result in perceptible short-term or detectable change in baseline conditions but are not expected to materially alter the character of the local economy/tourism and recreation sector/ community; and
- Negligible: changes that are not likely to result in perceptible change in baseline conditions or the character of the local economy/tourism and recreation sector/community.

15.34 Sensitivity considers how able a receptor would be (in this case the economy or tourism and recreation sector of the study area) to accommodate any changes in the baseline conditions. This is done with reference to the character of the receptor in question. The sensitivity criteria used in this assessment are as follows:

- High: the receptor has little or no capacity to absorb change without fundamentally altering its character and/or its of national economic/tourism/recreation importance;
- Medium: the receptor has the capacity to absorb some change without fundamentally altering its character and/or its of regional economic/tourism/recreation importance;
- Low: the receptor has significant capacity to absorb change without fundamentally altering its character and/or its of local economic/tourism/recreation importance; and
- Negligible: the receptor is highly resistant to change and is of little economic/tourism/recreation value.

15.35 In order to assess the significance of an effect is it then necessary to combine the sensitivity and magnitude of the change. The significance of socio-economic, tourism and community effects are necessarily a matter of judgement based on the scale and nature of the effects in question and existing baseline conditions. The significance criteria for the assessment of socio-economic and tourism/recreation effects of the Proposed Wind Farm Development are set out in Table 15.2. Effects can be adverse, neutral or beneficial in character.

Table 15.2: Matrix for Assessing Significance of Effect

Sensitivity	Magnitude			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

15.36 Effects of Moderate or Major significance are considered significant in terms of the EIA Regulations.

Baseline Conditions

15.37 This section describes the currently prevailing socio-economic, recreation and tourism conditions within the study area.

Social and Economic Conditions

15.38 Table 15.3 provides an age demographic breakdown for the THC and Moray Council areas, and for Scotland as a whole. Comparatively there is a smaller percentage of 16-44 year olds and a higher percentage of 45-74 and 75+ year olds in Highland and in Moray than there is in Scotland as a whole, which is indicative of an ageing population in these areas relative to Scotland as a whole.

Table 15.3: Demographic Breakdown

Age Group	THC (No.)	THC (%)	Moray (No.)	Moray (%)	Scotland (No.)	Scotland (%)
0-15	40,881	17.6	16,664	17.9	914,671	17.2
16-29	34,892	15.0	15,032	16.2	975,810	18.4
30-44	42,567	18.3	17,092	18.4	1,040,430	19.6
45-59	52,939	22.7	20,073	21.6	1,134,300	21.3
60-74	41,895	18.0	16,049	17.3	829,903	15.6
75+	19,736	8.5	8,000	8.6	418,486	7.9
All Ages	232,910	100.0	92,910	100.0	5,313,600	100.0

Source: National Records of Scotland, Moray Council Area Demographic Factsheet, August 2013
http://www.gro-scotland.gov.uk/statistics/at-a-glance/council-areas-map.html

15.39 Projections[11] show that the 75+ population in Highland and in Moray is likely to grow considerably by 2035 (by around 80%). It also shows that the working age population (16-64) is likely to decrease by around 6 % by 2035. These changes are likely to result in greater demands on the social and healthcare facilities and reduced workforce in the THC and Moray Council areas.

15.40 Economic activity and employment rates in Highland (84.3% and 81.6% respectively) and in Moray (85.1% and 81.9% respectively) are generally higher than the average for Scotland (79.6% and 75.6% respectively)[12]. The unemployment rate in Highland is 3.2% and in Moray is 3.7%, which are both lower than the average for Scotland as a whole (5 %).

15.41 Table 15.4 shows the breakdown of employment by sector in the Highlands and Islands (including Moray), compared with Scotland as a whole. In seven of the nine sectors, the Highlands and Islands has a higher proportion of employment than Scotland: public administration, education and health; distribution, hotels and restaurants; construction; transport and communications; agriculture and fishing; manufacturing; and other services (5.5% to 5.4%). The Highlands and Islands has a lower proportion of its employment than Scotland in banking, finance and insurance; and in energy and water.

Table 15.4: Industry of Employment, 2008

Sector	Highland (%)	Scotland (%)
Agriculture, forestry and fishing	2.3	1.7
Energy and water	0.9	1.8
Manufacturing	8.9	8.7
Construction	6.9	5.9
Distribution, hotels and restaurants	24.9	22.2
Transport and communications	6.1	5.1
Banking, finance and insurance	11.8	19.1
Public administration, education and health	32.8	30.0
Other services	5.5	5.4

Tourism, Recreation and Access Conditions

Designations

15.42 There are no Core Paths or Rights of Way located within the Site.

15.43 The Core Paths located within 5 km of the Site are as follows:

- THC Core Path BS05.01, which comprises the section of the Dava Way to the south of the Site; and
- Moray Council Core Path DA05, which comprises the section of the Dava Way to the east and northeast of the Site.

15.44 In addition, there are various Core Paths around Grantown-on-Spey, approximately 13.5 km south of the Site, and around Nairn, approximately 15 km northeast of the Site.

15.45 Scotways has identified the following Rights of Way within 5 km of the Site:

- Rights of Way coded GM1/HB24 (known as the *Via Regia),* GM2, GM3, GM4 (known as the *Loan Road)* and HB25 which lie approximately 5-6 km east of the Site;
- Heritage Paths, comprising the Dava Military Road (approximately 2 km east of the Site), the Dava Way (detailed above) and the Old Road to Forres (approximately 5 km west of the Site).

15.46 The Speyside Way long distance footpath passes through Grantown-on-Spey and lies approximately 14 km southeast of the Site at its closest point.

15.47 Sustrans National Cycle Route 1 lies approximately 10 km northwest of the Site at its closest point. The Dava Way is also promoted by the Sustrans National Cycle Network[13] as suitable for off-road cycling, as well as being used for equestrian purposes.

15.48 The A939 and A940 are promoted by Visit Scotland as a National Tourist Route, known as the 'Whisky Trail'[14].

15.49 The Cairngorms National Park boundary is located 7.8 km to the south of the nearest proposed turbine.

15.50 All of the aforementioned tourism and recreational designated routes are shown on Figure 15.1. The Dava Way, Speyside Way and the Moray Coast Trail (the latter of which lies outside of the study area) in combination form the Moray Way – a circular walking route of 95 miles.

15.51 The fourth Moray Walking Festival is scheduled to take place in June 2014. The Dava Way is used to hold events such as the 'Ghost Train Walk' and the 'WolfTrek Challenge'.

Other Tourism and Recreational Resources

15.52 In addition to the above routes, there are numerous existing footpaths throughout the study area. Those closest to the Site include footpaths within New Inn Wood, immediately north of the Site, and footpaths within Darnaway Forest, approximately 5 km north of the Site.

15.53 Other tourism and recreational resources within the study area include:

- Logie Steading Visitor Centre, located approximately 5 km north of the Site;
- Logie Farm Riding Centre, located approximately 2 km to the west of the Site
- The River Findhorn gorge at Randolph's Leap, located approximately 6 km north of the Site;

[11] http://www.gro-scotland.gov.uk/statistics/at-a-glance/

[12] Highland and Islands Enterprise, January 2011, Area Profiles for Highlands and Islands and for Moray

[13] http://www.sustrans.org.uk/ncn/map?lat=56.54737192673878&lng=-3.142090281250036&zoom=5&route-type=all-routes&filters=, accessed 12.09.2013

14 http://www.visitscotland.com/travel/around-scotland/national-tourist-routesm, accessed 13.09.2013

- Relugas Garden and Designed Landscape (GDL), located approximately 5 km north of the Site;
- Brodie Castle and Visitor Centre, owned by the National Trust for Scotland, located approximately 13 km north of the Site;
- Dallas Dhu Distillery and Visitor Centre, located approximately 12.5 km northeast of the Site.
- John Dewar & Son Ltd. Royal Brackla Distillery is located approximately 13 km to the northwest of the Site;
- Salmon fishing is popular on the River Findhorn which passes through the study area in a generally southwest to northeast direction. In addition Geddes Trout Fishery is located approximately 12 km to the northwest of the Site and keeps a variety of fish including trout, rainbow, brownies, perch and carp;
- Cawdor Castle (and GDL) lies approximately 14 km to the northwest of the Site. The Castle dates from the late 14th century and includes three gardens, the Cawdor Big Wood and a 9-hole golf course;
- Castle Grant (and GDL) is located approximately 14 km to the south southeast of the Site on the outskirts of Grantown-on-Spey
- Darnaway Castle (and GDL) is situated within Darnaway Forest and is located approximately 12 km north northeast of the Site
- There are a number of forests within the study area, such as Laiken Forest, Darnaway Forest (as highlighted above) and Newtyle forest
- Lochindorb, approximately 3 km to the south of the Site at its closest point, is popular for the bird watchers, fishing and viewing the remains of Lochindorb castle;
- There are a number of accommodation providers (principally bed and breakfast and self-catering cottages) within the study area.
- A number of hills are popular with hill-walkers in the study area. More details are provided in Table 15.5.
- The limits of the study area includes partially the settlements of Nairn, Forres and Grantown-on Spey.
- None of the tourist attractions within the study area are recorded in the top five visitor attractions for either the Highlands or for Moray[15]. Within the study area in 2009, Cawdor Castle was the most frequently visited attraction in Highlands (86,560 visitors / 12th highest in Highlands overall), and Logie Steading was the most frequently visited in Moray (55,000 visitors / 9th highest in 'Aberdeen and Grampian' overall)[16].

15.54 A series of viewpoints for assessment within **Chapter 7: Landscape and Visual Amenity (LVIA)** were agreed in discussion with statutory and non-statutory consultees including THC, Moray Council, the Cairngorms National Park Authority and SNH. Of the 17 viewpoints evaluated, 11 of these also reflect recreational and tourist features (i.e. designated sites, core paths, driving routes etc.). Table 15.5 identifies the viewpoints included within the LVIA which also represent a recreational resource. Cross reference should be made to **Chapter 7: Landscape and Visual Amenity** for details of the landscape and visual effects predicted on these receptors.

Table 15.5: Viewpoints Representing a Recreational Resource

Viewpoint no.	Viewpoint Location	Description
1	Little Aitnoch	This viewpoint is located close to the Site, on an old military road (General Wade's road) which is a Right of Way. It is close to the A939. It is representative of views seen by local residents, road users, including those on the A939 tourist route.
3	A940 above Kerrow	This viewpoint is at a layby on the A940. It is representative of views seen by road users on the tourist route.
3a	Knock of Braemoray	This viewpoint (photomontage) is located on top of the Knock of Braemoray and represents views of walkers above the A940.
7	Dava Junction	This viewpoint is located on the Dava Way and is adjacent to the A940, and representative of views seen by local residents, walkers on the Dava Way and road users on the A940, which is known as a Whisky Trail.
8	B9007, Old Military Road	This viewpoint is located at a layby on the B9007 near where General Wade's road leaves the route of current road. It is representative of views seen by road users, including those leaving the Cairngorms National Park along the B9007.
9	A940, Aucheorn	This viewpoint is on the A940 adjacent to local properties. It is representative of views seen by local residents, and road users on the A940 tourist route.
10	A939 and Dava Way	This viewpoint is located on the A939 shortly after leaving the Cairngorms National Park (northbound). It is at a layby, where the road is adjacent to the Dava Way. It is representative of views seen by road users and walkers on the Dava Way as they leave the National Park.
12	Carn Kitty	This viewpoint is located at the summit of Carn Kitty, and is used to represent views of walkers on this and other nearby hills.
13	Carn Allt Laoigh	This viewpoint is located on a hilltop near the B9007. It is used to represent views seen by people walking on this and nearby hills, and, in particular, to represent glimpsed views from the B9007 and the edge of the Cairngorms National Park.
14	Mill Buie	This viewpoint is located at the summit of Mill Buie, and is used to represent views of walkers on this and other nearby hills.
15	Carn an Uillt Bhric	This viewpoint is located at the subtle top with a trig point, on plateau between Findhorn Valley (Streens) and Moy. It is representative of views from walkers on the plateau and other upland areas to the west of the site.

[15] VisitScoltand (2013): Tourism in Scotland's Regions 2012. Accessed at http://www.visitscotland.org/pdf/Tourism%20in%20Scotland's%20Regions%202012.pdf on 20/10/2013

[16] Moffat Centre (2010). The 2009 Visitor Attraction Monitor. Accessed at: http://www.moffatcentre.com/media/moffatcentre/documents/visitorattractionreports/vam2009.pdf on 23/10/2013

Effects of wind farms on Tourism and Recreation: Evidence from Elsewhere

15.55 Research undertaken on behalf of the Scottish Government[17] provides the most relevant indicator of the potential impact of onshore wind farms on tourism in Scotland, though the study area in this chapter does not fall within one of the four case study areas within the report (Caithness and Sutherland; Stirling, Perth and Kinross; Scottish Borders; Dumfries and Galloway). Notwithstanding this, results of the study indicated that 25% of tourists felt wind farms had a negative impact on landscape, whereas the rest (75%) considered wind farms to have a beneficial or neutral effect on the landscape. The level of negative response to wind farms (25%) was the fourth highest of 11 other structures in the landscape, behind pylons (49%), mobile telephone masts (36 %) and power stations (26%).

15.56 The report also looked at the views of respondents by main tourist activity, walkers were found to be less opposed to wind farms than the norm, with only 19% expressing a negative attitude. For accommodation establishments with affected views, the study suggested an estimated net expenditure reduction of between 0.48% and 1.6%.

15.57 In general this research has found that the negative impact of wind farms on tourism at the national level is small and any reduction in employment in tourism should be considered in the context of the numbers currently directly employed in the wind power industry. The worst-case scenario was an adverse economic effect equivalent to 3.5% of jobs in tourism by 2015, compared with a situation where there were no wind farms. This was as a result of two potential effects: visibility from accommodation (affecting prices that some tourists might be willing to pay) and visibility from tourist routes (affecting some tourist's decision to return).

15.58 More recent research published by Visit Scotland in 2012[18] with respondents who had taken a holiday/short break in the UK in the past 12 months and would intend to do so again in the future found that:

15.59 80% of UK respondents when asked whether the presence of a wind farm would affect their decision about where to visit or where to stay on a UK holiday or short break stated their decision would not be affected; 20% stated that it would be affected.

- 83% of Scottish residents who responded stated their decision would not be affected by the presence of a wind farm with 17% claiming that it would affect their choices over which area to visit/where to stay whilst on a Scottish break.
- 52.1% of UK and Scottish resident respondents slightly/strongly disagreed with the statement that wind farms spoil the look of the UK (Scottish) countryside
- Respondents would not generally avoid an area due to the presence of a wind farm, with 55% of UK respondents and 56% of Scottish respondents slightly/strongly disagreeing with the statement 'I would tend to avoid an area of the countryside if I knew there was a wind farm there'. However, 18.5% of UK respondents and 16.6% of Scottish respondents slightly/strongly agreed that they would tend to avoid any parts of the countryside with wind farms.
- Responses indicate that there would be a fair degree of interest in visiting a wind farm development if there was a visitor centre with 40% of UK respondents stating that they would be interested with just over 33% stating no interest.

15.60 During an inquiry into the achievability of the Scottish Government's 2020 renewable energy targets, the Economy, Energy and Tourism Committee of the Scottish parliament heard evidence from a wide range of experts in the field. Tourism was one of the issues investigated during the course of the inquiry, with consideration given to the aforementioned reports. The findings of the Committee were published in 2012 and stated that: "*While some strongly held localised and anecdotal opinion exists, the Committee has seen no empirical evidence which demonstrates that the tourism industry in Scotland will be adversely affected by the wider deployment of renewable energy projects, particularly onshore and offshore wind*".

Future Baseline ('Do Nothing' Scenario)

15.61 The Highland Area Tourism Partnership Plan[19] aims to grow the value of tourism within Highland by around 4% annually, achieved primarily through an increase in visitor spend, as well as by increasing numbers. Accordingly, assuming the target were to be realised, it is anticipated that the importance of the tourism sector and recreational assets in the study area would increase, as well as an increasing provision of accommodation and activity providers. However, no specific strategies for change within the study area are identified. Therefore, for the purposes of this assessment, it is assumed that if the Proposed Wind Farm Development was not to proceed, there would be little or no significant change to the current economic and recreation and tourism baseline conditions described above.

Potential Impacts

Potential Construction and Decommissioning Impacts

15.62 Potential effects that could arise during construction and decommissioning of the Proposed Wind Farm Development would include the following:

- Negative direct effects on public access during construction/decommissioning, where certain areas of the Site would be restricted;
- Negative direct effects on public safety as a result of the construction of the Proposed Wind Farm Development;
- Positive direct economic effects on the local community as a result of local employment during construction and decommissioning;
- Positive indirect economic effects on the local community as a result of indirect and induced employment and increased local spend during construction and decommissioning.

[17] Riddington et al, Glasgow Caledonian University et al. (2008) The economic impact of wind farms on Scottish tourism

18 VisitScotland Insight Department, Wind Farm Consumer Research Topic Paper. August 2012

[19] http://www.highland.gov.uk/leisureandtourism/tourismdevelopment/highlandtourismpartnership.htm, accessed 12.09.2013

Potential Operational Impacts

15.63 Potential effects that could arise during the operation of the Proposed Wind Farm Development include the following:

- Negative or positive indirect effects on the perceived amenity value of the area for recreation and tourism due to changes in the landscape, views to and from the Site;
- Negative direct effects on recreational amenity on the Site, due to noise from the proposed turbines;
- Positive direct economic effects for landowners as a result of the new income stream provided by the operation of the Proposed Wind Farm Development;
- Positive direct employment created during the operational & maintenance phase of the Proposed Wind Farm Development;
- Positive indirect economic effects on the local community as a result of increased local spend during maintenance activity.

15.64 During the operational phase of the Proposed Wind Farm Development, existing land uses on the Site would continue to operate.

Mitigation

Mitigation by Design

15.65 As described in **Chapter 3: Design Evolution and Alternatives**, the Proposed Wind Farm Development has been designed with potential impacts on landscape and visual amenity in mind. The design aim has been to reduce and minimise landscape and visual impacts whilst achieving an appropriate landscape fit and avoiding areas constrained by other environmental considerations such as hydrology, habitat, peat and noise. There has been a reduction in the number of proposed turbines from 30 to 20, and a reduction in blade tip height from 125 m to 110 m. These measures have reduced the scale and visibility of the wind farm, particularly from some hill tops. As summarised in Table 15.5, 11 of the assessed viewpoints represent recreational and tourist features and analysis of these viewpoint was used to inform the final design. Potential noise effects was another key consideration and the nearest residential property is over 1.1 km away from any of the turbines.

Mitigation During Construction

15.66 The Proposed Wind Farm Development would create new demand for goods and services both during the construction and operational phases. Beneficial impacts can be maximised though the identification of potential local supply-chain firms that may be able to provide the goods and services required for the construction and operation of the Proposed Wind Farm Development – identification of potential suppliers (prior to formal procurement) will reduce the likelihood for potential benefits to be lost to the local economy.

15.67 The timing of road improvement works or delivery of abnormal loads will be discussed with THC and the local community at the pre-construction stage to consider seasonal variations in traffic flows.

15.68 The construction of the Proposed Wind Farm Development must comply with the requirements of the Construction (Design and Management) Regulations 2007. These regulations oblige the Applicant to notify the Health and Safety Executive (HSE) of the project, and to establish a safety management system encompassing risk assessment, design measures and management instructions to ensure the safety of construction and operational staff and the public. Best practise health and safety guidelines[20] would be adhered to and speed limits would be put in place to regulate traffic flows.

Mitigation during Operation

15.69 If approved, the Proposed Wind Farm Development would also generate on-going demand for goods and services during the operational phase. The extent to which local businesses would benefit from this demand would depend on the extent to which they are aware of the opportunities and able to supply the goods and services required. As in the construction phase, the value of the local effect could be increased by actively promoting awareness about these opportunities amongst local businesses. In addition, on-going work to match the local supply-chain and skills base with procurement opportunities would maximise beneficial effects.

15.70 During operation, access to the Site would not be restricted. It is likely that there would be some local and visitor interest in the Proposed Wind Farm Development, and the Applicant would make provision for a range of visitor information boards to be displayed appropriately on/near the Site.

Assessment of Residual Impacts

Residual Construction and Decommissioning Impacts

Social and Economic

15.71 The Applicant tries to ensure that, wherever reasonably practicable, local contractors and employees are used in all aspects of wind farm development. The major opportunity lies during the construction phase when suitably qualified local firms are identified and invited to bid for different aspects of construction, such as foundation laying and electrical works. Construction materials are normally sourced locally (i.e. within the county) and local transport and plant hire companies used wherever possible.

15.72 Based on analysis of their wind farm developments between 2010-2013, the Applicant estimates that a temporary workforce of up to 36staff would be created during the 28 month construction stage of the Proposed Wind Farm Development, based on a 60 MW scheme, with a significant proportion of these construction jobs being sourced locally.

[20] Renewable UK. Guidelines for onshore and offshore wind farms: Health and Safety in the Wind Energy Industry Sector, 2010

15.73 Direct and indirect employment are the principal socio-economic impacts associated with the construction phase of the Proposed Wind Farm Development. Construction personnel will be required for the following activities:

- access road construction (roads, hard-standings, drainage etc.);
- base construction (steel fixing, joiners, concrete works etc.);
- cabling; and
- turbine erection.

15.74 During the construction works, a number of vehicle movements will be required to transport labour, materials, and plant to and from the Site. This is likely to lead to opportunities for local companies, such as hauliers and heavy plant providers to capture sub-contractor roles. There will also be opportunities for local accommodation providers and service providers to benefit from the construction works, e.g. through providing accommodation for construction workers. Activities such as ground-works, site clearance and preparation, concrete, cabling, port activities and craneage could also be locally or regionally procured, generating benefit to the local area and wider regional economy. Due to the limited current presence of wind turbine manufacturing and assembly facilities, it is likely that most of the value linked to the manufactured components of the wind farm would accrue outside the local economy and possibly outside Scotland.

15.75 Further socio-economic impacts could result from importing labour with specialist skills from outside the local area to meet construction-related demand. However, it is considered likely that the majority of any imported employees would be based locally or take-up temporary accommodation in and around Nairn, Grantown-on-Spey or other nearby settlements.

15.76 Expenditure in the local economy during the development, construction and operation of wind farm projects in UK varies from project to project as a function of various factors, including project size, duration and availability of local suppliers. In recent years, the Applicant estimates typical spend with local stakeholders, suppliers and service providers has been in the region of £279,000 per wind turbine during the development, construction and first year of project operation. In some cases it has been possible to significantly improve on this number.

15.77 As an example of this RES' Meikle Carewe Wind Farm in Aberdeenshire was commissioned in 2013. Consisting of 12 turbines, the 10.2 MW project has provided local economic benefits with over £1.1 million spent locally to date. Contracts were set up with local hotels and cleaning companies. All the stone and concrete used during the construction process was sourced from local suppliers and local drivers utilised to deliver materials to the site. The balance of the workforce at Meikle Carewe lived locally during the working week, creating additional revenue for local accommodation providers. Further details are provided in **Technical Appendix 15.2**.

15.78 During construction of the Proposed Wind Farm Development, sensitivity of the local labour market to change is assessed to be low. The magnitude of change with respect to direct construction jobs is also judged to be low. This results in a minor beneficial effect.

15.79 In relation to expenditure in the local economy, the sensitivity of the local economy to change is assessed to be low and the magnitude of change is estimated to be low. Therefore, the extent of the effects on economic activities and local businesses is also considered to be minor beneficial.

15.80 Information on the broad order expenditure on decommissioning is available from comparative evidence elsewhere in the industry. Sources on the costs of decommissioning wind farms[21] tend to focus upon offshore locations due to limited evidence of decommissioning onshore wind farms to date. However, indicative costs are generally estimated to be between 2-3% of total construction costs.

Tourism, Recreation and Access

15.81 Public access within the Site would likely be temporarily restricted during the construction phase for health and safety reasons. The sensitivity of the Site to change in this respect is assessed to be negligible on the basis that there are no existing paths or rights of way within the Site, while the magnitude of change is estimated to be low. Therefore, the extent of direct effects on recreational access is considered to be negligible.

Residual Operational Impacts

Social and Economic

15.82 In terms of job creation during the operational stage, due to their remote operational control and limited need for servicing, wind farms do not create large numbers of on-site jobs.

15.83 However, it is expected that the Proposed Wind Farm Development would also support the equivalent of 1-2 part-time positions during operation and maintenance for the lifetime of the project (25 years). This figure excludes any supplementary works associated with for example the implementation of the habitat management plan or monitoring works required to satisfy certain conditions of consent.

15.84 As discussed in the Residual Construction and Decommissioning Effects section, the Applicant estimates for the Proposed Wind Farm Development a local spend of approximately £5.6 million during development, construction and first year of operation. Expenditure in the local community continues throughout the operational phase of the project.

15.85 To illustrate the anticipated scale of the expenditure, reference is again made to the 10.2 MW Meikle Carew wind farm, presented in **Technical Appendix 15.2** of this ES. For the 25 year lifetime of the Meikle Carewe project RES anticipates to spend locally in the region of £6.7 million (of which £3.3 million will be paid to the local council in business rates).

15.86 It is considered that the labour markets in the study area have sufficient capacity to absorb the operations and maintenance opportunities which would be created. During operation the sensitivity of the local labour market to change is estimated to be low and the predicted magnitude of change is negligible. The significance of effects from job creation during operation is therefore assessed as negligible.

[21] E.ON UK (2004)Optimisation through conceptual variation of a baseline wind farm-ECN 2002 and Scroby Sands Wind Farm.

15.87 In relation to expenditure in the local economy, the sensitivity of the local economy to change is assessed to be low and the magnitude of change is estimated to be negligible. The significance of effects is therefore judged to be negligible.

Wider Socioeconomic Benefits

15.88 In terms of potential supply chain spin-offs, wind energy development provides opportunities for the involvement of local, regional and Scottish suppliers in a range of activities, including research and development, design, project management, civil engineering, component fabrication/manufacture, installation and maintenance. There is expertise in all of these areas in the wider region, although a full wind energy supply chain covering all aspects of wind turbine component manufacture has not yet been developed within the region or indeed in Scotland as a whole.

15.89 Development of the Proposed Wind Farm Development would have positive spin-off effects on the development of the renewables sector in Highland and more generally in Scotland. With the Applicant's intention to source as much of the manufactured elements as locally as possible, employment impacts may also be generated through the manufacturing or assembly of wind turbine towers in Scotland. Scotland currently has wind turbine tower and base manufacturing plants in Argyll & Bute, Fife, and in the Highlands respectively.

15.90 Demand from development of the scheme would further support production and employment in Scotland, providing a boost to Scottish industry and Scotland's production capacity. Strengthening Scotland's industrial base, particularly in an industry where global demand is growing, improves the ability of Scottish firms to compete in world markets, in turn boosting Scotland's economy.

15.91 The key consideration in this context is that with an increasing number of wind farm schemes either operational, under development or having gained consent in Scotland, the commercial viability, and with it job prospects amongst Scottish firms, improve. Cluster benefits in the industry increase where firms are supported by final demand and intermediate demand. The net effect is to increase business and employment opportunities within Scotland's renewable energy sector, boosting the performance of local and national economies. The majority of wind farm developers in Scotland have expressed an intention to source from local suppliers where possible and would welcome increased capacity on the supply side.

15.92 Scottish Renewables[22] produced the first comprehensive study of employment in the renewables sector in Scotland covering the period 2011/2012, with the results showing that the industry is directly supporting more than 10,227 Full Time Equivalent (FTE) posts in project design, development, operation and its supply chain. In addition there are around 750 posts in renewable energy development and research in Further and Higher Education institutions, and some 150 employees involved in renewables in the public sector. This gives a total of 11,136 FTE posts in renewable energy in Scotland.

15.93 Of these renewable energy jobs, onshore wind is the largest employer by generation type with 2,235 jobs.

15.94 In addition, during the construction process there will be opportunities where those employed will develop skills of benefit to the local economy and to local businesses. Further, employment generated through the proposed wind farm will contribute to diversifying the local economy and help support the retention of the working age population.

15.95 The impact of the proposed wind farm is assessed as having a minor positive impact upon the regional and Scotland-wide renewables supply chain.

Business Rates Revenue Benefits

15.96 Business rates revenue from the development and operation of the proposed wind farm is estimated to be up to £9.188 million 9 over its 25-year lifetime. This is estimated from comparative experience of other wind farms in the UK[23] where the average business rates are calculated to be up to approximately £13,000 per MW installed. Potentially, the Proposed Wind Farm's rateable value would therefore be up to £780,000[24].

15.97 The business rate poundage in Scotland for 2012-2013 is £0.471 for properties with a rateable value of >£35,000[25]. This indicative rateable value would generate annual business rate revenue of up to £367,380. This does not take account of the current 'Renewable Energy Relief' on business rates available to eligible operators. Over the wind farm's 25 year operational lifetime, this would represent a total of £9.188 million, assuming constant rateable value and rate poundage over that period.

15.98 The business rate revenue generated from the wind farm is assessed as being of minor positive impact locally and of negligible significance nationally.

Land Owner Reinvestment Benefits

15.99 Land owner benefits would accrue through rental income paid by the wind farm developer/generator for both ground rent and a percentage of revenue generated by the wind farm. These rental payments are generally commercially confidential. However, the scale of the proposed wind farm is such that it would represent a valuable long term consistent addition to local income. It is not possible at this time to estimate the proportion of such revenue which will be retained and spent in the local economy, but it is likely that a proportion will be reinvested in the local area and accrue to the local economy for the benefit of local businesses and to support local employment.

15.100 Such rental income is likely to be regarded as of negligible impact on the economy at a local level.

[22] Scottish Renewables (2013): Scotland's Renewable Energy Sector in Number. Available at: http://www.scottishrenewables.com/scottish-renewable-energy-statistics-glance/. Accessed on 23 September 2013.

[23] Renewable UK (May 2012) Onshore Wind: Direct and Wider Economic Impacts

[24] Assumes a 60MW generating capacity for the Proposed Wind Farm Development (20 x 3MW turbines)

[25] The Scottish Government. A Brief Guide to Non-Domestic Rates (online).. Available at: http://www.scotland.gov.uk/Topics/Government/local-government/17999/11199/brief-guide. Accessed on: 20 September 2013

Community Benefit Fund

15.101 It is of note that a voluntary contribution to a community benefit scheme related to the Proposed Wind Farm Development at a rate of £2,000 per MW per year would be provided. In addition, a Local Electricity Discount Scheme to the value of £3,000 per MW per annum would be offered to those qualifying within a designated zone of benefit, providing an annual discount on their electricity bills for the lifetime of the Proposed Wind Farm Development. In aggregate these payments would amount to £5,000 per MW which is in line with THC guidance on community benefit. Over the lifetime of the wind farm this would amount to a total of £7.5million. However, these schemes would only be brought into effect should the Proposed Wind Farm Development be awarded consent and become operational. Details of the terms of the funds and their operation would be agreed at a later date.

Tourism, Recreation and Access

15.102 Public access to and within the Site would not be restricted during operation of the Proposed Wind Farm Development.

15.103 Potential indirect impacts would be related to changes to the visual and noise environment. Figure 15.1 shows theoretical visibility at each of the receptors locations described under Baseline Conditions.

15.104 Figure 15.1 shows that there is either very limited or no predicted visibility within the study area for:

- The Cairngorms National Park
- Grantown-on-Spey and the associated core paths
- The Speyside Way
- Logie Steading
- Randolphs Leap
- Cawdor Castle
- John Dewar & Son Ltd. Royal Brackla Distillery
- Geddes Trout Fishery
- Castle Grant
- Lochindorb (at the edge of the Loch)

15.105 As such, none of these receptor locations will be considered further.

15.106 Theoretical visibility is predicted for the following receptor locations:

- National Cycle Route 1
- Logie Farm Riding Centre;
- Reuglas GDL;
- Darnway Castle and GDL;
- Brodie Castle and Visitor Centre; and
- Dallas Dhu Distillery
- The Dava Way and other rights of way within 5 km
- The A939 and A940
- Local hills

15.107 National Cycle Route 1 is assessed within Chapter 7: Landscape and Visual. This chapter concludes that there would be theoretical visibility of the Proposed Wind Farm Development from various points, however that given the frequent settlements and woodlands along this route, and the distance to the Proposed Wind Farm Development (11 km at closest point), the actual visibility would be limited. Consequently this receptor is not considered further in this assessment.

15.108 Theoretical visibility of the Proposed Wind Farm Development is predicted for the Logie Farm Riding Centre. However intervening forestry screening is anticipated to prevent visibility, and therefore this receptor location is not considered further.

15.109 Relugas GDL and Darnaway Castle and GDL have been assessed in Chapter 10: Cultural Heritage and Archaeology. It has been concluded that for both receptor locations, woodland would substantially limit views of the Proposed Wind Farm from the majority of places where it would be theoretically visible. Accordingly these receptor locations are not considered further.

15.110 Brodie Castle and Visitor Centre and Dallas Dhu Distillery are located towards the limits of the study area. Given the distance from the Proposed Wind Farm (including the likelihood for screening of views due to intervening woodland and topography), and the nature of the facilities, these receptor locations are assessed to have low sensitivity.

15.111 Those receptor locations where people would be likely to experience particular visibility of the Proposed Wind Farm Development are:

- The Dava Way –assessed as having medium sensitivity, given its proximity to the Proposed Wind Farm Development and its incorporation in the Moray Way;
- The A939 and A940 – assessed as having medium sensitivity due to their promotion as National tourist routes, however also recognising that the volume of traffic on these routes is relatively low[26];
- The Rights of Way located within 5 km of the Site – with exception of the Dava Way (see above) all of these are assessed as being of local importance and therefore having low sensitivity; and
- Local hills (including Knock of Braemoray and Carn Allt Laoigh (the others having been assessed as having minor visual effects in Chapter 7: Landscape and Visual Assessment). These hills are assessed as having medium sensitivity.

15.112 All other receptor locations relating to accommodation and fishing are assessed as having local importance and therefore low sensitivity.

15.113 Forestry receptor locations are assessed as having negligible sensitivity.

[26] A939 south of B9007 junction recorded with average weekday traffic (24 hour 2 way flow) of 421 and Saturdays (24 hour 2 way flows) of 529. Refer to Chapter 14: Access, Traffic and Transport for more details.

15.114 Landscape and visual effects during operation of the Proposed Wind Farm Development are considered in detail in **Chapter 7: Landscape and Visual Assessment**. This assessment takes into consideration the receptors of landscape and visual effects. An impact on these receptors will only be experienced where people change their behaviour in response to the visual alterations to the landscape e.g. by no longer visiting the area; or by visiting less frequently; or by spending less money. As discussed in paragraphs 15.52-15.57, research undertaken on behalf of the Scottish Government provides the most relevant indicator of the potential impact of onshore wind farms on tourism in Scotland. The study found that the negative impact of wind farms on tourism at national level is small, with results indicating that 75 % of tourists considered wind farms to have a beneficial or neutral effect on the landscape. Accordingly, the effect that the Proposed Wind Farm Development would have on the selected views in relation to tourism and recreation and amenity value would partly depend on the personal opinion of the viewer.

15.115 Comparative studies demonstrate that there is little evidence that tourists or recreational users change their behaviour in response to an environment altered by the presence of wind farms. The predicted magnitude of change, taking account of the available comparative evidence on behavioural change, is therefore assessed as low for all receptor locations. Table 15.6 presents a summary of the significance of predicted effects for tourism, recreation and access.

Table 15.6: Significance of Tourism, Recreation and Access Effects

Receptor	Sensitivity	Predicted Magnitude of Change	Significance of Effects
Brodie Castle and Visitor Centre	Low	Low	Minor
Dallas Dhu Distillery	Low	Low	Minor
The Dava Way	Medium	Low	Minor
A939 & A940	Medium	Low	Minor
Knock of Braemoray	Medium	Low	Minor
Carn Allt Laoigh	Medium	Low	Minor
Rights of Way (including Old Road to Forres; Dava Militray Road; GM1/HB24 (known as the Via Regia), GM2, GM3, GM4 (known as the Loan Road	Low	Low	Minor
Tourist Accommodation	Low	Low	Minor
Fishing (River Spey & Lochindorb)	Low	Low	Minor
Forestry (including Laiken, Darnaway and Newtyle Forest,	Negligible	Low	Negligible

15.116 It also noted that effects could be either beneficial or adverse depending on how the Proposed Wind Farm Development is perceived by the individual receptor.

Cumulative Effects

15.117 Existing or under construction wind farms in the study area comprise: Berry Burn, Pauls Hill Phase 1 and 2 and a single turbine at Bognie Farm.

15.118 In addition to this there is an application stage wind farm at Hill of Glaschyle, a consented single turbine at Cluny Farm and the consented Tom Nan Clach wind farm.

15.119 Considering all of these types of cumulative wind farms (application, consented, existing and under construction) the closest wind farms to the Proposed Wind Farm Development are Hill of Glaschyle and Berry Burn. The Knock of Braemoray stands between Berry Burn and the Site, but not between the Site and Hill of Glaschyle. Tom nan Clach Wind Farm is the closest wind farm to the southwest, and has some intervisibility with the Proposed Wind Farm Development. In general, however, **Chapter 7: Landscape and Visual** concludes that the Proposed Wind Farm Development would be seen as a discrete group of turbines set to the west of the Knock of Braemoray, but following the same development trend as is seen across the study area.

15.120 **Chapter 7: Landscape and Visual** identifies only one significant cumulative effect– in relation to the Knock of Braemoray where a moderate effect on visual amenity is assessed. No significant cumulative effects are predicted in landscape and visual amenity terms on recreational routes. No significant cumulative effects are predicted either, as reported in **Chapter 10: Cultural Heritage and Archaeology**, **Chapter 12: Noise**, and **Chapter 14: Access, Traffic and Transport**.

15.121 Given the predominate absence of predicted significant cumulative effects, in relation to landscape and visual amenity; cultural heritage and archaeology; noise; and access, traffic and transport, it is judged that the cumulative impact on tourism, recreation and access would not be significant. There would be cumulative job creation opportunities and additional local spend, though cumulatively these benefits are judged to remain minor beneficial.

Summary

15.122 A socio-economic assessment of the Proposed Wind Farm Development has been undertaken, including effects on economy, recreation and tourism, land use, public safety and public access during the development, construction, decommissioning and operational phases. A summary of impacts and mitigation measures is provided in Table 15.7 below. No significant cumulative effects were identified.

Table 15.7: Summary of Potential Impacts of the Proposed Wind Farm, Mitigation and Residual Impacts

Potential Impact	Mitigation Proposed	Means of Implementation	Outcome/Residual Impact
Construction and Decommissioning			
Creation of direct l employment opportunities during construction	N/A	N/A	Minor beneficial
Indirect economic effects on the local community as a result of indirect employment and increased local spend	N/A	N/A	Minor beneficial
Direct employment during decommissioning stage	N/A	N/A	Negligible
Effects on public safety during construction	Best practice site safety procedures, restriction of access within working areas of site, in agreement with the Planning Authority	CDMS	Negligible
Operational			
Strengthening renewable energy supply chain	N/A	N/A	Minor beneficial
Revenue from Business Rates	N/A	Collected by Local Authority	Minor Beneficial
Landowner Re-investment Benefits	N/A	N/A	Negligible
Direct employment created during the operational & maintenance phase of the proposed wind	Employment of local contractors where possible	RES procurement policy	Negligible
Indirect economic effects on the local community as a result of increased local spend during maintenance activity.	Employment of local contractors where possible	RES procurement policy	Negligible
Indirect effects on recreation and tourism due to changes in the landscape, views to and from the Site	N/A	N/A	All receptors assesse as – either Negligible or Minor

16 Summary

Introduction

16.1 The purpose of this chapter is to summarise the mitigation measures which are proposed in each of the technical chapters to avoid, reduce, or offset residual environmental effects. The effects and mitigation measures have been compiled into a "Schedule of Mitigation Measures" which is presented in Table 16.1. Environmental effects and associated mitigation measures are presented in the order in which they appear within this ES:

- Landscape and Visual;
- Ecology;
- Ornithology;
- Cultural Heritage and Archaeology;
- Geology, Hydrology and Hydrogeology;
- Noise;
- Electromagnetic Interference, Aviation and Shadow Flicker;;
- Access, Traffic and Transport;
- Socioeconomics.

16.2 The main aim of the design process was to 'design out' the potential for environmental effects as far as possible. This chapter does not summarise 'mitigation by design'. This chapter covers the mitigation measures proposed to avoid, reduce or off-set construction, operation and decommissioning phase residual environmental effects of the Proposed Wind Farm Development. In the case of socio-economics, proposed mitigation measures would enhance beneficial effects.

16.3 The majority of the pre-construction and construction phase mitigation would be delivered through a Construction and Decommissioning Method Statement (CDMS). A draft CDMS is included as Technical Appendix 5.1. Further detail on specific mitigation measures to be included in the CDMS is contained in each of the technical chapters and these will be added to the CDMS at the pre-construction stage.

Table 16.1: Schedule of Mitigation Measures

Topic	Timing	Potential Impact	Mitigation/Enhancement Measure	Means of Implementation	Residual Effect
Landscape and Visual	Construction and Decommissioning	Landscape impact and visibility of construction/decommissioning works	Mitigation measures would include: ▪ vegetation and soil removal, storage and replacement; and ▪ vegetation restoration.	CDMS	Moderate / Minor
	Operation	Landscape impact and visibility of individual wind farm elements	Mitigation measures would include: proposed landscape works and tree planting to screen the substation. Further mitigation across the wider landscape is not possible due to the inherent nature of wind farm developments.	CDMS	Major / Moderate / Minor / Negligible
Ecology	Construction and Decommissioning	Temporary disturbance to Wet Modified Bog, Wet Dwarf Shrub Heath, Dry Dwarf Shrub Heath and Acid/Neutral Flush	Mitigation measures would include: ▪ vegetation and soil removal, storage and replacement; and ▪ vegetation restoration. Enhancement would include: ▪ blanket bog restoration across two separate areas of the Site through the Habitat Management Plan (HMP).	Habitat Management Plan (HMP) / ECoW	Negligible (with minor positive effect on blanket bog) / Not significant
		Disturbance of/pollution to Running Water	Mitigation measures would include: ▪ pre-construction ecological and baseline water quality monitoring ▪ pollution prevention measures	CDMS / ECoW	Minor / Not significant
		Disturbance impacts to fish	Mitigation measures would include: ▪ pollution prevention measures.	CDMS / ECoW	Negligible / Not significant
	Operation	Drying of the bog habitats on the Site through increased drainage	No mitigation required. Enhancement: ▪ Blanket bog restoration across two separate areas of the Site.	HMP	Minor positive / Not significant

Table 16.1: Schedule of Mitigation Measures

Topic	Timing	Potential Impact	Mitigation/Enhancement Measure	Means of Implementation	Residual Effect
		Drying of the wet heath habitats on the Site through increased drainage	No mitigation required	N/A	Negligible
		Pollution of watercourses within the Site	Mitigation would include: ▪ Pollution prevention measures; and ▪ ECoW.	CDMS / ECoW	Minor / Not significant
		Disturbance impacts to fish	Enhancement: ▪ Monitoring of fish and invertebrate species, as recommended by Findhorn, Ness and Lossie Fisheries Trust (FNLFT).	CDMS	Negligible / Not significant
		Disturbance to bat species (collision risk and barotrauma when flying in proximity of the turbines)	Mitigation measures would include: ▪ Felling of trees within the stand-off distance between the turbines and woodland edges/hedgerows. ▪ Tree replanting with native species present in the area.	CDMS	Negligible / Not significant
Ornithology	Construction and Decommissioning	Greylag Goose and Pink-footed Goose: Displacement of flight activity	No mitigation required	N/A	Negligible/ Not significant
		Black Grouse: Displacement of lekking and foraging activity	Mitigation measures included: ▪ Protection of lek sites during construction.	Breeding Bird Protection Plan (BBPP)	Negligible/ Not significant
		Short-eared Owl: Displacement of foraging activity	No mitigation required	N/A	Negligible/ Not significant
		Golden Plover: disturbance to nesting	Mitigation measures would include: ▪ protection of nest sites during the breeding season; ▪ habitat management to enhance blanket bog habitat will also improve conditions for Golden Plover.	Breeding Bird Protection Plan (BBPP);	Minor/ Not significant
	Operation	Collision risk (Greylag Goose, Pink-footed Goose, Short-eared Owl)	No mitigation required	N/A	Negligible / Not significant
		Displacement (Short-eared Owl, Golden Plover)	Mitigation measures would include: ▪ habitat management to enhance blanket bog habitat will also improve conditions for Golden Plover.	HMP	Negligible / Not significant
		Cumulative effects on Greylag and Pink-footed Goose	No mitigation required	N/A	Negligible / Not significant
Cultural Heritage and Archaeology	Construction	Disturbance of previously unknown buried archaeological remains	Mitigation measures would include: ▪ fencing off/visibly marking out feature 14 during construction to avoid accidental disturbance; ▪ watching brief during ground breaking works; ▪ identification and recording of any remains encountered; ▪ Written guidelines will be issued on behalf of the applicant for use by all construction contractors, outlining the need to avoid causing unnecessary damage to known sites.	Written Scheme of Investigation (WSI) to be approved by THCHET. Planning condition. Monitoring by professional archaeologist(s)	Negligible / Not significant
	Operation	Indirect impacts upon the setting of cultural heritage assets	No mitigation required	N/A	Minor / Negligible
Hydrology, Geology and Hydrogeology	Construction and Decommissioning	Increased sediment loads and acidification within runoff from disturbed ground, spoil heaps and excavations	Mitigation measures would include: ▪ implementation of runoff and sediment control measures.	CDMS	Minor / Not significant
		Accidental spillage/loss of chemicals and	Mitigation measures would include:	CDMS	Minor / Not significant

Table 16.1: Schedule of Mitigation Measures

Topic	Timing	Potential Impact	Mitigation/Enhancement Measure	Means of Implementation	Residual Effect
		other construction materials	▪ construction pollution prevention; ▪ water quality monitoring; ▪ procedures in the event of a spill plan.		
		Reduced water quality of the private water supplies receiving runoff from the Site	Mitigation measures would include: ▪ No construction shall take place within the 250 m of any abstractions; ▪ Implementation of the runoff and sediment control measure; ▪ the construction pollution prevention; ▪ water quality and monitoring and procedures in the event of a spill.	CDMS	Minor / Not significant
	Operation	Accidental spillages/loss of chemicals or hydrocarbons.	Mitigation measures would include: ▪ Operational pollution prevention; ▪ water quality monitoring; and ▪ emergency response plan.	Operational pollution prevention, water quality monitoring and emergency response plan (CDMS) Operational pollution prevention, water	Negligible / Not significant
		Reduced water quality of the private water supplies receiving runoff from the Site	Mitigation measures would include: ▪ Operational pollution prevention; ▪ water quality monitoring; and ▪ emergency response plan.	Operational pollution prevention, water quality monitoring and emergency response plan (CDMS)	Minor / Not significant
		Erosion of site infrastructure and surrounding soils and peat. Drying and oxidation of peat deposits leading to peat degradation and further enhanced erosion	Mitigation measures would include: ▪ site drainage design measures.	CDMS	Negligible / Not significant
		Leaching of concrete foundations	Mitigation measures would include: ▪ use of sulphur resistant concrete.	CDMS	None
		Changes to runoff and peak flow through increased impervious surfaces across catchments	Mitigation measures would include: ▪ appropriate drainage design.	SuDS / CDMS	Negligible / Not significant
		Reduced water quality and quantity of the private water supplies receiving runoff from the Site	Mitigation measures would include: ▪ appropriate site drainage measures and site drainage design.	SuDS / CDMS	Minor / Not significant
		Disconnection of water supply to GWDTE	Mitigation measures would include: ▪ Site drainage design.	SuDS / CDMS and Layout Design Constraints	Negligible / Not significant
Noise	Construction and Decommissioning	Potential for noise to be created during construction activities	Mitigation measures would include: ▪ Consideration will be given to noise emissions when selecting plant and equipment to be used on site. Where appropriate, quieter items of plant and equipment will be given preference; ▪ All equipment would be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable; ▪ Stationary noise sources would be sited as far away as reasonably possible from residential properties and, where necessary and appropriate, acoustic barriers will be used to screen them; ▪ The movement of vehicles to and from the Site will be controlled and employees will be instructed to ensure compliance with the	CDMS	Negligible / Not significant

Table 16.1: Schedule of Mitigation Measures

Topic	Timing	Potential Impact	Mitigation/Enhancement Measure	Means of Implementation	Residual Effect
			noise control measures adopted.		
	Operation	Operational noise affecting nearest neighbours	Mitigation measures include: ▪ planning conditions (as proposed in Technical Appendix 12.4) to be put in place to ensure that noise immissions from the Proposed Wind Farm Development are acceptable and are continuously monitored.	NA	Negligible / Not significant
Electromagnetic Interference, Aviation and Shadow Flicker	Operation	TV interference at up to 25 properties	Mitigation measures would include: ▪ redirecting aerials and installing satellite TV	Applicant consultation with THC	No impact / Not significant
		Interference with Air Traffic Control Radar at Inverness Airport	Mitigation measures would include: ▪ Applicant liaison with HIAL to resolve any concerns	Applicant consultation with HIAL	No impact / Not significant
		Impact on military low flying activities	Mitigation measures would include: ▪ wind turbines would be fitted with MoD approved infrared lighting.	Turbine procurement	No impact / Not significant
Access, Traffic and Transport	Construction	Severance	Mitigation measures would include: ▪ numbering of all construction vehicles; ▪ strict adherence to speed limits by all vehicles; ▪ drivers would be fully briefed to ensure that they are aware of pedestrian and cycle crossings along the route; ▪ AIL movements would be fully escorted.	Traffic Management Plan and Construction and Decommissioning Method Statement	Negligible / Not significant
		Driver Delay	Mitigation measures would include: ▪ signage along the route; ▪ details of AIL movement times would be placed in the local press, publicised in advance and placed and on the wind farm website.	Traffic Management Plan	Negligible / Not significant
		Accidents and Safety	Mitigation measures would include: ▪ numbering of all construction vehicles; ▪ strict adherence to speed limits by all vehicles; ▪ drivers would be fully briefed to ensure that they are aware of pedestrian and cycle crossings along the route; ▪ AIL movements would be fully escorted.	Traffic Management Plan and Construction and Decommissioning Method Statement	Negligible / Not significant
Socio Economics	Construction and Decommissioning	Creation of local employment opportunities	No mitigation required Enhancement measures would include: ▪ use local supply-chain firms to provide the goods and services required for construction of the Proposed Wind Farm Development, where possible.	Applicant procurement policy	Minor beneficial / Not significant
		Indirect economic effects on the local community as a result of indirect employment and increased local spend	No mitigation required	N/A	Negligible / Not significant
		Effects on public safety during construction	Mitigation measures would include: ▪ best practice site safety procedures.	CDMS	Negligible / Not significant
		Direct effects on recreational amenity on the Site, due to noise	No mitigation required	N/A	Negligible / Not significant
	Operation	Strengthening renewable energy supply chain	No mitigation required	N/A	Negligible / Not significant

Table 16.1: Schedule of Mitigation Measures					
Topic	**Timing**	**Potential Impact**	**Mitigation/Enhancement Measure**	**Means of Implementation**	**Residual Effect**
		Revenue from Business Rates	No mitigation required	N/A	Negligible / Not significant
		Landowner Re-investment Benefits	No mitigation required	N/A	Negligible / Not significant
		Direct employment created during the operational & maintenance phase of the Proposed Wind Farm Development	Enhancement measures would include: ▪ Employment of local contractors where possible.	Applicant procurement policy	Negligible/ Not significant
		Indirect economic effects on the local community as a result of increased local spend during maintenance activity	Enhancement measures would include: ▪ Employment of local contractors where possible.	Applicant procurement policy	Negligible/ Not significant
		Indirect effects on recreation and tourism due to changes in the landscape, views to and from the Site	No mitigation required	N/A	Negligible / Not significant